FORESTRY ABSTRACTS

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EDITORIAL NOTE

The late appearance of this number, due to the recent difficulties in the printing industry, is much regretted. Its Abstract Section, and that of 20(4), are both of record size. The Leading Article Series will be resumed with Volume 21.

ABSTRACT SECTION

0. FORESTS, FORESTRY, AND THE UTILIZATION OF FOREST PRODUCTS: GENERAL

For general *regional* accounts see section 90

Translations

See Nos. 2873, 2931, 3473, 3557, 3588, 3664, 3669–70, 3855, 3892.

0 (038). Dictionaries

See No. 2697.

0 (047.1). Progress Reports

2685. MARSHALL, W. E. **United Kingdom of Libya Administration of Tripolitania. Nazirate of Agriculture Department of Forests, annual report for the year 1957/58.** Nazara of Agriculture, Tripoli. 1958. pp. 49.

The Department of Forests within the Nazara of Agriculture was formally constituted a separate department in April 1957, and this is its first annual report. Citation in *F.A.*: *Rep. Dep. For. Tripolitania.* General policy is outlined in addition to an account of the year's work.

0 (048.1). Bibliographical Lists

See also Nos. 2715, 2793, 2874, 2992, 3130, 3216, 3275, 3387, 3390, 3728, 3794, 3846, 3896, 4007.

2686. BĂLĂNICĂ, T., *et al.* Bibliografia forestieră romînă 1860–1956. **[Rumanian forestry bibliography 1860–1956.]** Editura Agro-Silvica de Stat, Bucharest. 1958. pp. 533. 5867 refs. [Rum.]

Arranged according to the Oxford Decimal Classification, with an author index. A partial translation of the O.D.C. is appended.

2687. BĂLĂNICĂ, T., DIMITRIU, V., and DEMETRESCU, I. C. Bibliografia forestieră romînă pentru anul 1957. **[Rumanian forestry bibliography for the year 1957.]** Editura Agro-Silvica de Stat, Bucharest. 1958. pp. 57. 420 refs. [Rum.]

The titles of the 420 items are translated into French.

0 (05). Periodicals. Yearbooks. Directories. Almanacs, Calendars, Diaries

2688. ***Erdészettudományi Közlemények*** Erdömérnöki Föiskola, Sopron.

A continuation of *Erdömérnöki Föiskola Közleményei.* The first number for 1958 has 16 articles in Hungarian with Russian and German, and French or English summaries. Citation in *F.A.*: *Erdészettud. Közl., Sopron.*

0 (084.3/.4). Maps. Atlases

See also No. 4001.

2689. ***Weltforstatlas.*** **[World forestry atlas [part].]** Fritz Haller Verlag, Berlin.

[Cf. *F.A.* 20 No. 1344.] Further sheets, as follows: China (forest distribution), Korea (forest distribution; forest formations) and Taiwan (forest distribution); Thailand, Indochina (forest formations); U.S.A.—Oregon, Washington (distribution of the most important species); and Australia (vegetation forms; distribution of the principal commercial species).

2690. **Ontario resources atlas.** Department of Lands and Forests, Toronto, Ontario. 1958. pp. 36. Price $1.

Maps include: forest economic divisions; ecological sections (a forest classification); conservation authority and township forests; county forests under agreement; forest resources inventory; provincial forests; timber limits; pulp and paper mills and sawmills; land use; and native tree species.

2691. **Bechuanaland. Sheets 2326A, 2327A and B, with part of the Union of South Africa.** Directorate of Overseas Surveys, Tolworth. 1958. 3 sheets.

Scale 1:125,000. Shows land use, hills, rivers, tracks etc.

2692. **[Map of] Sarawak: sheets 2/112/8, 2/113/2.** Directorate of Overseas Surveys, Tolworth. 1958. 2 sheets.

Scale 1 : 50,000. Shows plantations, freshwater swamp forests and other primary forests in areas between 112° 45′ and 113° 30′ E. and 2° 30′ and 3° N.

0 - - 011. Terminology. Nomenclature

See Nos. 2697–8, 2869, 3643–6.

0 - - 015. Mathematical and Statistical Methods

See No. 3022.

FACTORS OF THE ENVIRONMENT. BIOLOGY

11. Site Factors: Climate, Situation, Soil, Hydrology (Water Conservation, Soil Conservation and Erosion)

111.2. Radiation and Temperature

2693. FAIRBAIRN, W. A. **Methods of light intensity measurement in forest stands. II. The use of light measurement instruments in the field.** *Forestry* 31 (2), 1958 (155–62 + 4 photos). 4 refs.

Recent developments are discussed and the use being made by the Department of Forestry, University of Edinburgh, of the photographic photometer, the luxmeter, and the barrier-layer cell is described. The use of filters is considered and a note added on the position reached by research into the problem. *Author's summary.* [Cf. *F.A.* 15 No. 1029; 18 No. 1224.]

111.5. Wind

See Nos. 3188 *et seq.*

111.8. Climatology. Climate and Microclimate

See also Nos. 2875, 2911, 2954, 3188 *et seq.*, 3301, 3567–8.

2694. **Arid zone research. XI. Climatology and microclimatology: proceedings of the Canberra Symposium.** Unesco, Paris. 1958. pp. 355 + 12 photos. Many refs. [E.f. *or* F.e.] Price $11.00, 55*s.*, or Fr.3000.

Gives papers in full, with summaries of discussions. Sessions were held on: (1) Evaporation and the water balance; (2) Radiation and the thermal balance; (3) Inter-relationships of climatic elements and flora; (4) Inter-relationships of climatic elements and fauna; (5) Microclimate of man and domestic animals; (6) Modification of microclimate; (7) Salting and chemistry of rainwater; (8) Climatological observational requirements in arid zones. Papers of particular forestry interest include: Some observations on vegetation changes and water relationships in arid areas (*C. S. Christian* and *R. O. Slatyer*) [dealing with a degraded Mulga [*Acacia aneura*] community]; The modification of microclimate by vegetation in open country and in hilly country (*R. Geiger*) [including a study of the forested slope of the Grosser Falkenstein]; Trees and microclimate (*N. Hall, V. S. Russell* and *C. D. Hamilton*) [summarizing (*a*) general effects of trees on microclimate and (*b*) results of observations in the Australian Capital Territory on precipitation and evaporation inside and outside the forest, together with suggestions for future research].

2695. PAPP, L. A záródás és az állományklíma kapcsolata. **[Canopy closure and stand climate.]** *Erdészettud. Közl., Sopron* 1958 (1), (132–50). 11 refs. [Hu.hu.russ.e.g.*russ.e.g.*]

A study was undertaken to investigate the effect of microclimate in derelict, very open stands on conversion by underplanting. Observations were made in spring and summer, in an Oak stand, a *Pinus nigra* stand, and *Robinia pseudoacacia* stands of varying density. In the closed stands, climatic extremes were less than in the open; soil temperature was lower, but not the temperature of the air layer close to the ground. Relative humidity was > 10% higher than, and evaporation < 50% of that in the open. The climate of gaps showed much greater extremes than that of closed stands, and in large gaps soil temperatures were sometimes higher than in the open, though not the temperature of the lower air. With decreasing density, stand climate approximates to that of gaps, and in stands with < 50% of full stocking the microclimate is no longer that of a forest, and may even give rise to greater extremes than those occurring in the open. *From author's summary.*

2696. WAGNER, R. Az erdö klímájáról. **[The climate of the forest.]** *Idöjárás, Budapest* 61 (2), 1957 (117–25). 17 refs. [Hu.hu.g.] L.S.

Reviews central European literature, indicates the chief characteristics of forest climate, and reports the results of observations made in Hungarian Beech and *Quercus cerris* forests, and in floodplain forests.

114. Soil. Soil Science

See also Nos. 3300–1.

2697. PLAISANCE, G., and CAILLEUX, A. Dictionnaire des sols. **[Dictionary of soils.]** La Maison Rustique, Paris. 1958. pp. viii + 604. [F.] Price *Fr.*7500. I.F.B.

Comprises: (1) scientific French terms for pedology and related sciences; (2) scientific terms from other languages introduced into France, with French translations; (3) popular and dialectal French names of soils, land types, vegetation types, topographical features etc.; (4) a few foreign words or words used in French overseas territories; (5) pedological symbols and abbreviations in French and other languages. [Cf. *F.A.* 20 No. 14.]

2698. JAEGER, H., MÜCKENHAUSEN, E., and EHWALD, E. Forstliche Standortaufnahme. Begriffe und Fachausdrücke. **[Forest site surveys. Concepts and terminology.]** Land- und hauswirtschaftlicher Auswertungs- und Informationsdienst e.V. (AID), Hiltrup bei Münster. 1958. pp. 57. 118 refs. [G.]

Presents and discusses definitions etc. agreed by the Arbeitskreis Standortskartierung of the Arbeitsgemeinschaft Forsteinrichtung [in the Deutscher Verband forstlicher Versuchsanstalten]. The first author covers "slope" and "soil depth"; the second, horizons, ground-water, and soil structure; and the third, soil structural types and humus. English equivalents are given.

114.1 Soil Physics

See also Nos. 2703, 2706, 2720, 2924.

2699. JAEGER, H., and JACOB, H.-E. Der Wasserhaushalt einiger Böden im Ostthüringischen Buntsandsteinbezirk im Jahre 1952. **[The water economy of some East Thuringian bunter sandstone soils in 1952.]** *Arch. Forstw.* 7 (12), 1958 (975–87). 18 refs. [G.g.russ.e.]

Tabulates and graphs throughout the year the moisture available (total less wilting-point water) in

(*a*) a typical pseudogley carrying planted 60- to 70-year Beech/Oak, (*b*) a podzol-pseudogley with drainage impeded after long rain and carrying 80-year Pine with some Larch and Oak, and (*c*) a 30-cm. brown-earth podzol superimposed on another soil and carrying 60-year Pine and poor Spruce. Suitable species, mixtures, and special silvicultural tending are recommended for each.

2700. KOZEL, J. Vliv mechanické přípravy půdy a různých druhů hnojení na průběh půdní vlhkosti podzolovaných pískách. **[The influence of mechanical tillage and different methods of fertilizing on soil moisture in podzolized sands.]** *Sborn. čsl. Akad. zeměd.* (*Lesn.*) 4 (11), 1958 (995–1004). 9 refs. [Cz.cz.russ.g.]

Part of a recent clearing was ploughed to a depth of 60 cm. and (*a*) lime and basalt, and (*b*) pond mud were applied [amounts not stated] and part of the plot left as control (*c*). Another area of the clearing (*d*) was merely worked shallowly with a rotary cultivator. In the summer, down to a depth of 80 cm., the soil on the ploughed area was moister (by 86, 34 and 12% respectively in the three years 1955–1957) than that under the neighbouring forest stand. There was also more moisture in the ploughed soil than in the cultivated soil. The best values of soil m.c. were found on plots (*b*) and (*a*), where, over the three years, it averaged 24% above that of (*d*); the soil m.c. of (*c*) also averaged 7% above that of (*d*). Treatments (*b*) and (*a*) caused the greatest changes in the physical, chemical and mechanical properties of the soil; the maximum capillary capacity was twice that of the forest soil.

2701. BOROWIEC, S. Zależność właściwości gleb wytworzonych z piasków luźnych oraz bonitacji i runa od głębokości wody gruntowej. **[The influence of the depth of the ground-water level on the properties of loose sandy soils, on soil fertility and on the ground vegetation.]** *Sylwan* 102 (2), 1958 (27–35). [Pol.russ.e.]

Traces the gradual improvement in soil structure and increase in acidity from sites with a ground-water level of 350 cm. to those with one of 50–100 cm.; and also the associated changes in the proportions of 11 ground-flora species.

114.2. Soil Chemistry

See also Nos. 2703, 2706–7, 2741, 2921–4.

2702. KUBOTA, J., and LAZAR, V. A. **Cobalt status of soils of southeastern United States: II. Ground-water podzols and six geographically associated soil groups.** *Soil Sci.* 86 (5), 1958 (262–8). 14 refs.

[Cf. *F.A.* 19 No. 3752.] Leaf samples of *Nyssa sylvatica* var. *biflora*, which accumulates Co, were analysed from 53 sites (Carolina to Texas). Values from ground-water podzols in Carolina were predominantly < 5 p.p.m., values from other sites (on regosols, red-yellow podzolics, humic-gleys and lateritic soils) ranged from 10 to 295 p.p.m. Consistenhtly igh values came from Texas and Mississippi.

114.3. Soil Formation. The Soil Profile and its Development. Litter, Humus etc.

See also Nos. 2921–4, 2945, 3335.

2703. PELÍŠEK, J. Genetická klasifikace a charakteristika půdotvorných procesů v lesních oblastech ČSR. II. Půdotvorné procesy neutrální až mírně alkalické, hydrogenní a zasolovaci. **[Genetic classification and characterizaton of the soil-forming processes in the forests of Czechoslovakia. II. Neutral to moderately alkaline, water-induced, and saline processes.]** *Sborn. čsl. Akad. zeměd.* (*Lesn.*) 4 (10), 1958 (839–56). [Cz.cz.russ.g.]

Presents a table subdividing these major processes into groups and types (e.g. processes of grey rendzina soils, gley soils or solonetz soils). Chief factors discussed are the chemical, physical, and biological characters and their dynamics. [Cf. *F.A.* 19 No. 3765; 20 No. 1365.] *From author's summary.*

2704. **Karri [*Eucalyptus diversicolor*] silviculture: litter fall.** *Rep. For. Dep. W. Aust. 1957/58*, 1958 (25).

Well stocked stands (virgin forest 0·65 canopy and regrowth 0·87 canopy) shed litter at rates of 45 and 48 cwt./acre respectively during the 12 months' seeding period ended June 1957. Maximum fall occurs during the summer: 25% of total litter and seed fall was deposited in one month (February) and 50–80% in 3 months, January to March.

2705. OKSBJERG, E. Sønderdelingsprocesser i sur humus. **[Decomposition processes in acid raw humus.]** *Skr. K. Skogshögsk., Stockh.* No. 31, 1958. pp. 30. 28 refs. [Sw.sw.e.]

Presents data, extracted from earlier work [see *F.A.* 19 No. 2639], from laboratory studies of the effect on CO_2 production from Spruce raw humus of e.g. temperature, sterilization and antibiotics, and discusses their practical significance.

114.4. Soil Classification. Soil Types

See also Nos. 2702–3, 2963, 3154–6.

2706. BOROWIEC, S. Gleby 'Leśnego Wzgórza'. **[The soils of 'Leśne Wzgórze'.]** *Sylwan* 102 (12), 1958 (3–21 + 1 map). 4 refs. [Pol.russ.e.]

Tabulates chemical, mechanical and physical data on the four different types of soil found on a naturally forested hill (max. alt. 80 m.) near Szczecin, and discusses the vegetation found on each.

114.5. Soil Fertility. Soil Toxicity. Soil Depletion and Exhaustion

See also Nos. 2701, 2914–5, 2958, 2987, 3154, 4008.

2707. LEAF, A. L. **Determination of available potassium in soils of forest plantations.** *Proc. Soil Sci. Soc. Amer.* 22 (5), 1958 (458–9). 6 refs. O.R.E.

Compares various soil biological and chemical tests in respect of their suitability for predicting K deficiency for Red Pine grown in Wisconsin and New York. The tests were: the *Azotobacter* plaque and *Aspergillus niger* tests; extraction of soil by *N* NH_4 acetate of pH 6·9 and 4·6; extraction by *N* NH_4NO_3 of pH 6·9 and 4·0; extraction by 0·4 *N*

HCl; ignition of NH_4-saturated soil followed by extraction with neutral *N* NH_4 acetate; and extraction with boiling *N* HNO_3. The last method provided the sharpest distinction between K-deficient and non-deficient forest soils, as detected by the rate of growth and response of plantations to the application of K fertilizers. *Author's summary.*

114.6. Soil Biology

See also Nos. 2705, 2963, 3142.

2708. Symposium sur les méthodes d'étude microbiologique du sol. **[Symposium on methods of studying soil microbiology.]** *Pédologie, Bulletin de la Société Belge de Pédologie, Gand* 7 (Spec. no.), 1957. pp. 207. [F. or E.]

Contains 23 papers by European authors with discussion.

2709. BURGES, A. **Micro-organisms in the soil.** Hutchinson University Library, London. 1958. pp. 188. 175 refs. Price 10*s.* 6*d.*

Contains chapters on: the soil and its structure; the organisms present in the soil; methods of examining the soil population; the form of the organism in the soil; the distribution of micro-organisms within the soil; ecology of the soil organisms; the role of micro-organisms in the cyclic systems; the influence of man on soil micro-organisms; and the soil as a system in dynamic equilibrium.

2710. HENDERSON, M. E. K. **Metabolism of methoxylated aromatic compounds by soil fungi.** *Repr.* from *Journal of General Microbiology, London* 16 (3), 1957 (686–95). 15 refs.

A chemical and respiration study testing *Haplographium* sp. from deciduous woodland soil, *Hormodendrum* sp. from afforested sand dunes under Scots Pine, and *Penicillium* sp. from moorland soil, with mono-, di- and tri-methoxybenzoic acids, and with mono- and di-hydroxybenzoic acids. It is suggested that the ability of these fungi to demethylate compounds in which the methoxyl group is attached to the C_6H_6 ring, may be important for the transformation of lignified plant material in the soil.

2711. WILSON, D. L. **A survey of the soil algae of two vegetation types in central Oklahoma.** *Abstr. of thesis,* in *Dissert. Abstr.* 19 (5), 1958 (940). O.R.S.

In investigations on the top ½ in. of soil from two Blackjack/Post Oak forests and two prairies, 72 out of a total of 82 species and varieties were found in the forests, and 58 in the prairies, 48 being common to both vegetation types.

2712. O'CONNOR, F. B. **Age class composition and sexual maturity in the Enchytraeid worm population of a coniferous forest soil [near Bangor].** *Oikos* 9 (2), 1958 (272–81). 7 refs. [E.e.]

2713. GABBUTT, P. D. **The seasonal abundance of some arthropods collected from Oak leaf litter in S.E. Devon.** *Abstr.* in *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 2, 1958 (717). [E.] P.R.

The numbers of arthropods (extracted by Tullgren funnels) were expressed in terms of sq. m. and of 100 g. Oak leaves, as an estimate of the living space available. [Cf. *F.A.* 18 No. 1249.]

2714. WALLWORK, J. A. **Notes on the feeding behaviour of some forest soil acarina.** *Oikos* 9 (2), 1958 (260–71). 10 refs. [E.e.]

Describes interspecific, intraspecific and interstadial differences in food habits of 20 oribatid and one acarid species collected from a Hemlock/Yellow Birch forest floor in Michigan. Factors affecting food preferences are discussed.

114.7. Soil Surveys and Surveying

See No. 3604.

116. Hydrology. Water Conservation, Soil Conservation and Erosion

See also Nos. 2694, 2765, 2973, 3129–44, 3146, 3184, 3189, 3191–2, 4008, 4018.

2715. PRICE, R. **Watershed management research in the Southwest (a literature review).** American Forestry Association. 1958. pp. 33. 13 pp. of refs.

A paper presented at the 83rd annual meeting of the American Forestry Association, Tucson, Arizona. Findings are discussed under the section headings: hydrological processes, watershed improvement studies, and water yield studies in the main vegetation types.

2716. MOLČANOV, A. A. Vodoohrannoe značenie lesa. **[The hydrological significance of forest.]** *Izv. Inst. Gorata bălg. Akad. Nauk., Sofia* No. 2, 1957 (3–48). [Russ.]

Reviews Soviet work on surface run-off on clay-loam and sandy soils, and foreign studies of surface run-off inside and outside the forest. A Soviet method of studying the hydrological significance of vegetation, based on the soil water-balance, is described, the factors involved being precipitation (including interception), water loss in evapotranspiration, and loss in run-off. Using this method, and taking Ivanov's transpiration measurements, data are tabulated on the hydrological significance of different forest types, chiefly Pine and Oak, and of stands of different ages in the Moscow province.

2717. RAHMANOV, V. V. Javljajutsja li osadki, zaderživaemye kronami derev'ev, poterjami dlja lesa? **[Is precipitation intercepted by tree crowns lost to the forest?]** *Bot. Ž.* 43 (11), 1958 (1630–3). 8 refs. [Russ.]

In experiments to discover how much of the precipitation intercepted by tree crowns is actually lost, measurements were made of transpiration (assessed by the daily weight-loss of cut twigs with their bases in water) from leaves (*a*) sprinkled 6–8 times daily with water, to simulate rain, and (*b*) left dry. In 1951, with twigs of *Betula pubescens, Caragana arborescens* and *Corylus avellana*, it was found that in each case (*a*) transpired much less than (*b*) (in *C. arborescens* 24% less per g. of twig).

Continued investigations in 1952 on Aspen, Pedunculate Oak, *Salix viminalis*, Black Poplar and Pear confirmed these results; (*a*) transpired less than (*b*), in Black Poplar by 40%, in Oak by 15%, in Aspen by 25·6%, in Pear by 12%, and in *S. viminalis* by 26%. Water intercepted by the crowns may thus play an important part in reducing water losses by transpiration.

2718. SATTERLUND, D. R. **Vegetation storage on the watershed.** *J. For.* 57 (1), 1959 (12–4). 16 refs.

The differences in the moisture content of trees at different seasons are discussed. From this, the amount of water stored by vegetation, and which may be made available by the internal variations in the m.c. of forest trees, is estimated. A formula is presented for vegetation storage capacity, expressed in inches of depth over the watershed area for any species, provided that its total volume (stem + branchwood) is known. The possible storage capacity of Yellow Birch, Beech, Ponderosa Pine, and Douglas Fir (sapwood only) at the end of the summer is tabulated for various tree ages and site qualities. It varies from 0·81 to 0·05 in. or 2930 to 194 cu. ft./acre.

2719. THORNTHWAITE, C. W., and MATHER, J. R. **Instructions and tables for computing potential evapotranspiration and the water balance.** *Publications in Climatology, Drexel Institute of Technology, Centerton, New Jersey* 10 (3), 1957 (185–311).

Includes nearly 100 pp. of tables.

2720. FILIPPOVA, A. K. Vodopronicaemost' merzloj lesnoj podstilki. **[The water permeability of frozen forest litter.]** *Trudy Gosudarstvennogo Gidrologičeskogo Instituta, Leningrad* No. 54, 1956 (119–25). 15 refs. [Russ.russ.] N.L.L.

The m.c. of frozen litter in young Oak stands ca. 10 years old in the Kamennaya Steppe and Veliki Anadol varies from 100 to 700% of the oven-dry weight. In frozen litter with < 4 mm. water per cm. of depth, the free pore space is 50–60%; with 4–7 mm., ca. 20%; and with > 7 mm. from 1 to 20%. As the movement of water through frozen litter depends on the free pore space, the permeability of litter is determined by the moisture content at the time when it is frozen.

2721. LEWIS, W. K. **Investigation of rainfall, run-off, and yield on the Alwen and Brenig catchments.** *Repr.* from *Proceedings, Institution of Civil Engineers, London* 8, 1957 (17–52). 15 refs.

Presents data for two catchments on the Denbighshire plateau, mostly open, except for 1680 acres afforested in 1949 near the Alwen reservoir. Further afforestation is planned, and it is suggested that the area, where run-off has been gauged since 1911 and 1922 respectively in the two catchments, presents a unique opportunity for research into the hydrological effects of afforestation.

2722. **[Hydrological research.]** *Rep. For. Dep. Kenya 1955/1957*, 1958 (15).

Two major long-term experiments to assess the effects of changing the vegetative cover of forested water-catchment areas are being undertaken in Kenya. One is designed to assess the effect of replacing Bamboo by coniferous plantations in the Aberdares. The catchments of 3 streams are involved; (*a*) was cleared of Bamboo and planted with *Pinus patula* in May, 1957, (*b*) is a control, and (*c*) will be converted to *P. patula* by normal *shamba* practice. The other experiment aims at assessing the hydrological changes consequent on converting forest to tea plantations.

2723. HAW, R. C. **The conservation of natural resources.** Faber & Faber Ltd., London. 1959. pp. 256 + 36 photos. 20 refs.

Deals mainly with erosion and soil conservation by good land use, use of organic fertilizers etc., and contains chapters on water conservation, and other resources (e.g. minerals, wildlife), all with particular reference to S., E. and Central Africa. An appendix lists plants used for conservation, including > 130 trees and shrubs.

2724. BHADRAN, C. A. R., and KAITH, D. C. **Conservation measures in catchment areas and flood control.** *Indian For.* 84 (12), 1958 (710–7).

A note on afforestation and soil conservation prepared by the Standing Committee of the Control Board of Forestry in consultation with the Central Soil Conservation Board, with suggestions for conservation measures in the upper catchments above the projected dams.

2725. PRASAD, B. N. **Concrete proposals outlining forest management and afforestation in river valley projects.** *Indian For.* 84 (12), 1958 (718–24).

Emphasizes the necessity of proper management and/or establishment of forests in the upper parts of catchments, in relation to the various river valley projects under the Indian 5-year plan, if the costly reservoirs are not to be silted up within 20 years.

2726. BLACK, P. E., and CLARK, P. M. **Timber, water, and Stamp Creek.** Southeastern Forest Experiment Station, Asheville. [1958?] pp. [11].

An illustrated extension pamphlet describing logging operations in Georgia incorporating measures for control of erosion and water conservation worked out in collaboration with Coweeta Hydrological Laboratory. The chief of these were: gravelled roads, located away from the streams, allowing round-the-year working; tree-length uphill cable skidding, and levelling of ruts etc. at the end of operations.

2727. HAN, S.-T., and WANG, Y.-K. **[Preliminary account of an attempt to fix sands by [planting] shrubs.]** *For. Sci., Peking* 1958 (3), (280–91). 10 refs. [Chin.chin.russ.]

Studies in the last 5 years have shown *Salix flavida, Caragana microphylla* and *Lespedeza bicolor* to be effective in fixing sands. *S. flavida*, which is widely distributed in the shifting sands of the W. part of the province of Liaoning and the E. part of Inner Mongolia, propagates easily and grows fast. Spring, before sap-rise, and autumn are the best time for taking cuttings, and in autumn the top-layer of dry sand is at its thinnest, which facilitates work. Cuttings survive better than seedlings and also grow faster. On slopes easily covered with

shifting sand, the height of the cuttings above ground should be 5–10 cm., on [wind] erodible sites 3–5 cm. only. 1–2 years after planting, competing bushes should be cut in early spring or late autumn so that their branches may help in fixing the sands. Once the sands are stabilized, the above 3 species can grow well and improve the soil, as also does *Amorpha fruticosa*. *C. microphylla* and *L. bicolor* also do well on wind-erodible and denuded sands or on dry sites, but they need initial protection after planting. *A. fruticosa* is a good species for fixing sands in low-lying moist sites.

14. Systematic Zoology

145.7. Insecta. Entomology

See also Nos. 3379 *et seq.*, 3856 *et seq.*

2728. HARRIS, W. V. **Isoptera.** *Repr.* from *Parc National de l'Upemba.* Institut des Parcs Nationaux du Congo Belge, Brussels. 1958. pp. 3–26 + 3 plates. [E.]

Lists and describes 18 species belonging to 13 genera (Kalotermitidae and Termitidae) collected in the Upemba National Park, S.E. Belgian Congo, including 5 not identified at species level, and 5 new species.

2729. EICHHORN, O. Morphologische und papierchromatographische Untersuchungen zur Artentrennung in der Gattung *Dreyfusia* C.B. (Adelgidae). **[Morphological and paper chromatographical investigations into the differentiation of species in the genus *Dreyfusia*.]** *Z. angew. Ent.* 42 (3), 1958 (278–83 + 1 plate). 13 refs. [G.g.e.] O.H.

[Cf. *F.A.* 20 Nos. 82–3.] The chromatograms (of which 12 are reproduced in colour) show similar patterns for *Dreyfusia merkeri* [cf. *F.A.* 19 No. 4479] and *D. nüsslini* on the one hand, and *D. piceae* f. *typica* and *D. prelli* on the other. There were differences between developmental stages, but not between stem- or shoot-infesting forms of the same species, and only minor differences between individuals taken from *A. alba* or *A. nordmanniana.*

2730. MCGUGAN, B. M. [Compiler]. **Forest Lepidoptera of Canada recorded by the Forest Insect Survey. Volume I. Papilionidae to Arctiidae.** *Publ. Dep. Agric. Can.* No. 1034, 1958. pp. 75. 10 refs.

A checklist with data on distribution, hosts, feeding habits, general abundance and seasonal history of species handled by the Survey since its inception in 1936. The present volume includes 82 species.

2731. SHEPHERD, R. F. **Factors controlling the internal temperatures of Spruce budworm larvae, *Choristoneura fumiferana* (Clem.).** *Repr.* from *Canad. J. Zool.* 36, 1958 (779–86). 6 refs.

Laboratory studies showed a direct relationship between the radiation intensity striking a larva and the excess of larval temperature over air temperature. The effect of wind velocity, evaporation and shading on this excess is discussed.

2732. DUMBLETON, L. J. **The immature stages of some New Zealand longhorn beetles (Coleoptera Cerambycidae).** *Transactions of the Royal Society of New Zealand, Wellington* 84 (3), 1957 (611–28). O.R.S.

The larvae of 20 species—2 Prioninae, 13 Cerambycinae and 5 Laminae—are described, figured and keyed. The eggs of 6 and the pupae of 10 species are also described. *Author's summary.*

2733. WARREN, G. L. **A method of rearing bark- and cambium-feeding beetles with particular reference to *Hylobius warreni* Wood (Coleoptera: Curculionidae).** *Repr.* from *Canad. Ent.* 90 (7), 1958 (425–8). 7 refs.

A whole-bark medium was more successful than a bark homogenate for rearing barkbeetle larvae. Poor results were obtained from rearing pupae in whole-bark chambers.

2734. HEIMPEL, A. M. **Notes on methods for rearing two Canadian forest insects [*Pristiphora erichsonii* and *Malacosoma disstria*].** *Report of the Entomological Society of Ontario, Toronto* No. 88, 1957 (1958), (42–3). 2 refs. I.I.E.

2735. THOMPSON, G. H. **On the final instar larva of *Pseudorhyssa alpestris* (Holmgren) (Hym., Ichneumonidae).** *Ent. mon. Mag.* 94 (1135), 1959 (276 + 1 tbl.). 3 refs.

A description of the 5th instar of the larva, an ectoparasite of *Xiphydria camelus.*

2736. FERRIÈRE, C., and KERRICH, G. J. **Handbooks for the identification of British insects. Vol. VIII. Part 2 (a). Hymenoptera. 2. Chalcidoidea. Section (a).** Royal Entomological Society of London. 1958. pp. 40. 23 refs. Price 8*s.* 6*d.*

15. Animal Ecology. Game and Fish Management, Hunting, Shooting and Fishing

See also Nos. 2694, 2723, 2875, 3197, 3364 *et seq.*

2737. VANĚK, J. Dynamika narůstání potravy zvěře na kořovém patru doubrav. **[Variations in the browse available to deer from the underwood of Oak stands.]** *Sborn. čsl. Akad. zeměd. (Lesn.)* 4 (11), 1958 (971–94). 31 refs. [Cz.cz.russ.e.g.]

Simulated browsing on Privet (*Ligustrum vulgare*), *Cotoneaster vulgaris*, Hazel (*Corylus avellana*) and Dogwood (*Cornus sanguinea*) revealed that the greatest leaf weight (per 1000 leaves) was found on Dogwood on Sept. 6, and on the other plants on Aug. 22. The lowest weight of shoots on Dogwood and Cotoneaster was noted on Oct. 10, and on the other plants on Nov. 15. Cotoneaster had the greatest weight of leaves per unit of height, and Hazel the greatest weight of shoots. Cotoneaster and Dogwood could grow new leaves if defoliated before the beginning of Aug., Privet if defoliated before July, and Hazel if before the first half of June.

2738. LITTLE, S., MOORHEAD, G. R., and SOMES, H. A. **Forestry and deer in the Pine region of New Jersey.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 109, 1958. pp. 33. 31 refs.

A summary of knowledge from observations and studies since 1928, on the food habits of *Odocoileus virginianus.* It feeds mainly on woody browse during the dormant season, and on non-woody

plants at other times. In some areas, where the deer population exceeds the carrying capacity of the range, overbrowsing is detrimental to timber production, e.g. in swamps the favourite browse species, *Chamaecyparis thyoides*, needs a considerably longer rotation or has been replaced by associated hardwoods and shrubs that are less palatable. Sustained or increased deer populations in these conditions will have to depend on artificial food supplies from farm crops or on an increase in the natural food supply by forestry practices.

16. General Botany

160. Plant Chemistry

See also Nos. 2702, 2756, 2760, 2773, 2776, 2828, 2922, 3206, 3208, 3288, 3706 *et seq.*, 3933 *et seq.*

2739. **Proceedings of the symposium on phytochemistry, Kuala Lumpur, December 1957.** Unesco Science Cooperation Office for South East Asia. 1958. pp. 183. Many refs.

Includes the following papers: A survey of Australian phytochemistry (*H. H. Hatt*; 221 refs.); A survey of phytochemistry in Hong Kong (*H. R. Arthur*; 13 refs.); A survey of Indian phytochemistry. Part 1 (*A. Chatterjee*; 732 refs.); A survey of Indian phytochemistry. Part 2. (*I. C. Chopra* and *K. L. Handa*; 199 refs); A survey of Indonesian phytochemistry (*N. G. Bisset*; 10 refs.); A survey of Japanese phytochemistry (*T. Kariyone*; 49 refs.); A survey of Malayan phytochemistry (*B. Douglas*; 23 refs.). A survey of New Zealand phytochemistry (*L. H. Briggs*; 22 refs.); A survey of phytochemistry in the Philippines (*A. C. Santos*; 278 refs.); Plant chemistry in Viet-Nam (*Truong-Van-Chom*; in French; 38 refs.); The structure of avicennin (*H. R. Arthur*) [describing a substance isolated from the bark of *Zanthoxylum avicennae*]; A phytochemical survey of some plants from the South Moluccas (*N. G. Bisset*; 7 refs.); The constituents of the bark of *Phebalium nudum* (*L. H. Briggs* and *R. C. Cambie*); Studies on the alkaloids of some apocynaceous plants (*A. Chatterjee*; 11 refs.); Preliminary investigations of the C.N.S. action of the Indonesian *Rauwolfia* spp. (*A. J. Darman*; 13 refs.); Optically active compound of anacardiaceous exudates (*H. H. Hatt*); Chemical constituents of the plants of Coniferae and allied orders (*T. Kariyone*; 9 refs.) [cf. *F.A.* 20 Nos. 2742–4]; and Alkaloids of *Rauwolfia perakensis* (*A. S. C. Wan* and *A. K. Kiang*; 12 refs.).

2740. ÇEPEL, N. Kayın, meşe, karaçam ve göknar ağaçlarının asimilasyon organlarında bazı önemli besin maddelerinin mevsimlik değişimi üzerine araştırmalar. **[Seasonal fluctuations of some nutrients in the foliage of Beech, Oak, Silver Fir and *Pinus nigra*.]** *Istanbul Üniv. Orm. Fak. Derg.* 8 (1), 1958 (92–138). 46 refs. [Turk.g.*g.*]

Presents foliage analyses for *Fagus orientalis*, *Quercus pubescens*, *Abies* sp. and *Pinus nigra* from sites near Istanbul, over two growing season, giving the concentrations and actual content of Ca, Mg, P, K, and N. Owing to dilution effects, concentrations sometimes decreased when contents increased with increased weight of leaves.

2741. ROBINSON, W. O., BASTRON, H., and MURATA, K. J. **Biogeochemistry of the rare earths with particular reference to Hickory trees.** *Abstr.* in *Bulletin of the Geological Society of America, New York* 68 (12), 1957 (1786–7). O.R.S.

Hickory trees concentrate the elements of the rare-earth group in their leaves to an unusual degree—as much as 2300 p.p.m. of total rare earths, based on dry weight of the leaves. The proportion of the rare-earth elements in the leaves and in the exchange complex of the soil are very similar, indicating that the trees do not appreciably fractionate the rare earths.

2742. KARIYONE, T., *et al.* **[Chemical constituents of the plants of Coniferae and allied orders. XX. Studies on the components of the leaves of *Metasequoia glyptostroboides* Hu et Cheng (1). XXI. Studies on the components of the leaves of *Picea glehnii*. (1). Chemical structure of a new glucoside, piceid.]** *J. pharm. Soc. Japan* 78 (7; 8), 1958 (801–2; 935–6). 8 refs. [Jap.e.] O.R.S.

(XX) Sequoyitol, now found for the first time in plant leaves, and hinokiflavone were detected as components of fallen leaves. Paper chromatography showed the presence of glucose, fructose, galactose and sucrose. *From authors' summary.*

2743. KARIYONE, T., and SAWADA, T. **[Studies on flavonoids in the leaves of Coniferae and allied plants. I. On the flavonoid from the leaves of *Torreya nucifera* Sieb. et Zucc. II. On the flavonoids from the leaves of *Cycas revoluta* Thunb. and *Cryptomeria japonica* D. Don var. *araucarioides* Hort.]** *J. pharm. Soc. Japan* 78 (9), 1958 (1010–5). 21 refs. [Jap.e.] O.R.S.

(I) A new flavone, kayaflavone, $C_{33}H_{24}O_{10}$, obtained by methanol extraction from dried leaves of *T. nucifera*, proved to be a monomethyl ether of ginkgetin (obtained from the leaves of *Ginkgo biloba*). (II) A new flavone, sotetsuflavone $C_{31}H_{20}O_{10}$, from the leaves of *C. revoluta*, was found to be a monodemethylated compound of ginkgetin. Sotetsuflavone, kayaflavone and sciadopitysin were obtained from the leaves of *C. japonica* var. *araucarioides*. *From authors' summaries.*

2744. KARIYONE, T., and SAWADA, T. **[Studies on flavonoids in the leaves of Coniferae and allied plants. III. On the flavonoid from the leaves of *Taxus cuspidata* Sieb. et Zucc. and relations between ginkgetin, kayaflavone, sciadopitysin and sotetsuflavone. IV. On the flavonoid from the leaves of *Chamaecyparis obtusa* Endl.]** *J. pharm. Soc. Japan* 78 (9), 1958 (1016–22). 12 refs. [Jap.e.] O.R.S.

(III) Sciadopitysin was obtained from the leaves of *T. cuspidata*. The chemical relations of the four compounds are discussed. (IV) A new flavone, hinokiflavone, $C_{30}H_{18}O_{10}$, obtained from the dried leaves of *C. obtusa*, may be a bisflavonoid of complicated structure similar to ginkgetin. *From authors' summaries.*

2745. SAWADA, T. **[Studies on flavonoids in the leaves of Coniferae and allied plants. V. Relation**

between the distribution of bisflavonoids and taxonomical position of the plants.] *J. pharm. Soc. Japan* 78 (9), 1958 (1023–7). 4 refs. [Jap.e.*e.*] O.R.S.

Some 70 species from 6 families of 30 genera of conifers, and *Ephedra gerardiana* and *Casuarina stricta* were examined. Results, showing the distribution in them of ginkgetin, kayaflavone, sciadopitysin, sotetsuflavone, and hinokiflavone, are tabulated; this distribution was related to the taxonomic position of the species. Hinokiflavone was present only in the Cupressales and in the Taxodiaceae; none of the 5 bisflavonoids were present in the Pinaceae. *From author's summary.*

2746. ISOI, K. **The leaf waxes of deciduous conifers.** *J. pharm. Soc. Japan* 78 (7), 1958 (814). 2 refs. [E.] O.R.S.

The leaf waxes from *Larix leptolepis*, *L. gmelinii* and *Pseudolarix kaempferi* among the Pinaceae, and from *Taxodium distichum*, *Glyptostrobus pensilis* and *Metasequoia glyptostroboides*, showed very much lower ester values than those of *Pinus thunbergii* and *Cryptomeria japonica*, and are all of the non-estolide type, whereas among evergreen conifers of the Pinaceae and Cupressaceae leaf waxes are estolide, and among the Taxaceae, Podocarpaceae and Sciadopityaceae non-estolide.

2747. ASSARSSON, A., and THEANDER, O. **The constituents of conifer needles. I. Low molecular weight carbohydrates in the needles of *Pinus sylvestris*.** *Acta chem. scand.* 12 (6), 1958 (1319–22). 5 refs. [E.] O.R.S.

Glucose, fructose, sucrose, melibiose, raffinose, *myo*-inisitol, and pinitol were isolated from needles collected from *P. sylvestris* [in October], together with smaller amounts of cellobiose, laminaribiose, a glucopyranosyl-fructose and a glucopyranosyl-mannose. Oligosaccharides were found containing residues of glucose, galactose and fructose. Paper chromatography indicated the presence also of small amounts of galactose, arabinose and xylose. *From authors' summary.*

2748. MANSKAJA, S. M., and KODINA, L. A. Hinnaja i šikimovaja kisloty v rastenij. [**Quinic and shikimic acids in plants.**] *Dokl. Akad. Nauk SSSR* 123 (4), 1958 (733–6). 19 refs. [Russ.] A.P.B.

Tabulates and discusses the results of analyses for these acids in young shoots (buds, needles, bark, cambium and young wood) and cones of *Pinus sylvestris*. The highest contents of both acids were found in needles, and the lowest in young wood in course of formation. The contents, especially of shikimic acid, were high in green and lower in lignifying cones.

2749. PARKER, J. **Changes in sugars and nitrogenous compounds of tree barks from summer to winter.** *Naturwissenschaften* 45 (6), 1958 (139). 4 refs. [E.] O.R.S.

Summarizes the results of measurements in August and December for barks of a number of native and exotic species growing wild in Westchester county, New York. Protein N increased in winter in all species, and stachyose, raffinose, melezitose, sucrose, fructose and glucose in most species. More detailed results, covering other substances, are given for *Robinia pseudoacacia*.

2750. KONAR, R. N. **A qualitative survey of the free amino acids and sugars in the developing female gametophyte and embryo of *Pinus roxburghii* Sar.** *Phytomorphology* 8 (1/2), 1958 (168–73). 12 refs. O.B.D.

2751. KONAR, R. N. **A quantitative survey of some nitrogenous substances and fats in the developing embryos and gametophytes of *Pinus roxburghii* Sar.** *Phytomorphology* 8 (1/2), 1958 (174–6). 6 refs. O.B.D.

2752. BARTELS, H. Enzyme im keimenden Samen von *Pinus nigra* Arn. [**Enzymes in germinating seeds of *P. nigra*.**] *Naturwissenschaften* 45 (20), 1958 (495). 4 refs. [G.] O.R.S.

Discusses the activity of 7 enzymes, varying in intensity at different stages of germination and in different parts of the seed. Research continues and will be reported in greater detail elsewhere.

2753. CAILLOUX, M. Sur une méthode d'appréciation quantitative de l'activité amylasique dans le bois d'érable. [**A method of quantitative assessment of amylase activity in Maple wood.**] *Abstr.* in *Ann. ACFAS* 23, 1957 (86). [F.] L.S.

Standard tests for blood and urine (Smith and Roe) have been adapted to wood extracts.

2754. CAILLOUX, M., and LEMAY, Y. L'amylase dans la sève de l'érable à sucre (*Acer saccharum*). [**Presence of amylase in the sap of *A. saccharum*.**] *Abstr.* in *Ann. ACFAS* 23, 1957 (86–7). [F.] L.S.

The presence of this enzyme has been proved by a modified Smith and Roe test.

2755. SKJERNAA, S. E. Forekomst af bitterstoffer i pilearter. [**Occurrence of bitter substances in Willow species.**] *Hedeselsk. Tidsskr.* 79 (15), 1958 (321–6). [Dan.] C.G.B.

Following observations that hedges of *Salix purpurea* in Øland were comparatively little damaged by stock, and the isolation of bitter substances from its leaves, leaves of 35 other species were analysed. Many contained small amounts, but substantial amounts were found only in *S. pentandra*, *S. cuspidata* (*S. fragilis* × *pentandra*), *S. purpurea*, *S. myrsinifolia* and *Salix* sp. ('bussant'), which are described in some detail. The constitution of the substance(s) concerned has not yet been investigated. The presence of bitter substances in *S. cuspidata*, a hybrid between a species containing and one lacking bitter substances, suggests the presence of a dominant gene and the possibility of breeding to produce crosses distasteful to stock.

161. Physiology

See also Nos. 2710, 2749–54, 2795, 2809, 2909 *et seq.*, 2992, 3042, 3288, 3344, 3348, 3663, 3846–9.

2756. THIMANN, K. V. [Editor]. **The physiology of forest trees: a symposium held at the Harvard Forest, April 1957, under the auspices of the Maria Moors Cabot Foundation.** Ronald Press Co., New York. 1958. pp. xvi + 678. Many refs.

Contains the following papers (with discussions and lists of references): The rise of sap in lianas (*P. F. Scholander*; 11 refs.); Rates and patterns of moisture movement in trees (*K. N. H. Greenidge*; 1 ref.); Patterns in the seasonal water content of trees (*R. D. Gibbs*; 16 refs.); The structure of tracheids in relation to the movement of liquids, suspensions, and undissolved gases (*I. W. Bailey*; 10 refs.); Nitrogenous compounds in tree xylem sap (*E. G. Bollard*; 36 refs.); The physiology of Maple [*Acer saccharum*] sap flow (*J. W. Marvin*; 14 refs.); Dew absorption by conifers (*E. C. Stone*; 68 refs.); Photosynthesis of trees as affected by their environment (*P. J. Kramer*; 65 refs.); Recording gaseous exchange under field conditions (*B. Hunter*; 9 refs.); The relationships of ontogenetic development and environmental modification to photosynthesis in *Pinus taeda* seedlings (*F. H. Bormann*; 15 refs.); Biochemical processes in the living bark of the Black Locust [*Robinia pseudoacacia*] tree in relation to frost hardiness and the seasonal cycle (*D. Siminovitch* and *A. P. J. Chater*; 21 refs.); Distribution of turpentine components among species of the genus *Pinus* (*N. T. Mirov*; 27 refs.); The Mäule reaction, lignins, and the relationships between woody plants (*R. D. Gibbs*; 42 refs.); Oleoresin exudation pressure in Slash Pine [*P. elliottii*] its measurement, heritability, and relation to oleoresin yield (*P. F. Bourdeau* and *C. S. Schopmeyer*; 4 refs.); The relationship between the growth and mineral nutrition of conifers (*L. Leyton*; 18 refs.); The translocation of rubidium^{86} and calcium^{45} in trees (*D. A. Fraser*; 17 refs.); Anatomical and physiological investigations on food translocation in trees (*B. Huber*; 19 refs.); Translocation of organic substances in the phloem of trees (*M. H. Zimmermann*; 28 refs.); Sieve-tube sap via aphid stylets (*T. W. Mittler*; 7 refs.); Bud dormancy and root development in *Acer saccharinum* (*S. D. Richardson*; 40 refs.); The role of auxin and other exudates in mycorrhizal symbiosis of forest trees (*V. Slankis*; 87 refs.); The role of light in the growth of root primordia in the stem of the Lombardy Poplar [*Populus nigra* var. *italica*] (*S. Shapiro*; 31 refs.); Root growth of tree seedlings in relation to aeration (*L. Leyton* and *L. Z. Rousseau*; 19 refs.); Cytoplasmic streaming in the cambium of White Pine (*K. V. Thimann* and *D. Kaufman*; 16 refs.); An epiphytotic tumor of White Spruce, *Picea glauca* (*P. R. White*; 13 refs.); Studies in the auxin physiology of Longleaf Pine [*P. palustris*] seedlings (*C. L. Brown*; 15 refs.); Photoperiodic control of growth and dormancy in woody plants (*R. J. Downs*; 20 refs.); Photoperiodism in seeds and seedlings of woody species (*P. F. Wareing* and *M. Black*; 25 refs.); Photoperiodism in relation to tree improvement (*S. S. Pauley*; 13 refs.); Thermoperiodism in trees (*P. J. Kramer*; 12 refs.); Methods and concepts applied to a study of flowering in Pine (*R. G. Stanley*; 71 refs.); Experimental control of tree growth and reproduction (*K. Sax*; 15 refs.); The seed dormancy mechanism in Pine (*E. C. Stone*; 43 refs.); The relation of environmental factors to flowering in Spruce (*D. A. Fraser*; 23 refs.); Reproductive development in *Pinus sylvestris* (*P. F. Wareing*; 6 refs.).

2757. LEVITT, J. **Frost, drought, and heat resistance.** *Repr.* from *Protoplasmatologia, Handbuch der Protoplasmaforschung*, Springer-Verlag, Wien. Vol. 8, 1958. pp. 87. 215 refs. [E.]

This section covers terminology; quantitative aspects; the nature of defence mechanisms; frost resistance—avoidance and tolerance (hardiness); drought resistance—avoidance (resistance to water loss and increased water uptake) and tolerance; heat resistance; and relation between frost, drought and heat tolerance. One chapter deals with frost resistance in animals (including insects), the rest is devoted to plants.

2758. AHROMEJKO, A. I. Fiziologičeskoe obosnovanie povyšenija produktivnosti lesov. [**Physiological bases for increasing forest productivity.**] *Lesn. Hoz.* 11 (5), 1958 (10–6). [Russ.]

A review of recent work (done mainly at the VNIILM Physiology Laboratory) on fertilizers and fertilizer utilization, micro-organisms and their significance in tree nutrition, absorbing roots, and the rate of absorption and movement of water and nutrients. The important part played by tracers in this research is emphasized.

2759. ATROHIN, V. G. Radioavtografija v lesovodstve. [**Autoradiography in forestry.**] *Lesn. Hoz.* 11 (6), 1958 (15–9). 3 refs. [Russ.]

Describes the use of the technique to detect the uptake of labelled fertilizers from the soil by trees, the movement of the fertilizers in the trees, and also the movement of fertilizers applied to the leaves.

2760. PARTANEN, C. R. **Application of autoradiographic techniques to studies of shoot apices.** *Nature, Lond.* 182 (4651), 1958 (1747–8). 7 refs.

Autoradiographic localization of nucleic acid synthesis was applied to shoot apices, using P^{32} in the form of inorganic phosphate as the labelling substance. In this preliminary report, details are given of observations on *Pinus lambertiana*. Autoradiographs showing total nucleic acid synthesis (deoxyribonucleic acid) indicate a rather high level of activity, which appears to have a relatively uniform distribution throughout the apex.

2761. WHITE, P. R., *et al.* **'Root pressure' in gymnosperms.** *Science* 128 (3319), 1958 (308–9). 9 refs. O.R.S.

Discusses earlier literature [cf. K. N. H. Greenidge in *F.A.* 19 No. 76] and describes field experiments, using manometers, on trees 15–20 ft. high, 25–40 years old, of *Pinus strobus*, *Picea glauca* and *Picea rubens*, with *Betula lutea*, *Populus alba* and *Fraxinus americana* for comparison. Readings were taken in July and Aug. 1957, the driest part of the year, when positive sap flow is least likely to be evident. Of 51 manometers on roots of 17 conifers, 24 showed positive sap flow and in 14 the columns developed exceeded 40 cm. (the length of the manometer tubes) in height; when additional tubes were attached to 13 of the manometers, flows up to 80 cm. were recorded. In comparable conditions the maximum flows observed from angiosperms were 100 cm. (*P. alba* and *F. americana*). No flow was observed from either set of trees on dry soil. It is concluded that,

contrary to previous statements, active water secretion and root pressure exist in gymnosperms.

2762. UEDA, K., and MANABE, I. **[Studies of absorption and migration of isotope P^{32}. (6). Migration of P^{32} after painting leaves of Sasa species.]** *Trans. 65th Mtg. Jap. For. Soc.* 1956 (176–7). [Jap.]

The leaves of (*a*) six culms in a clump of naturally grown *Pleioblastus pubescens*, each ca. 20 cm. long, and (*b*) six seedlings of *Sasa nipponica* reared in sand, whose culms were ca. 20 cm. long at 6 months, were painted with P^{32} (2 millicuries in 500 c.c. solution), and after 42 and 17 days respectively the leaves were removed and the culms and roots tested by G. M. counter held 2 cm. away. Radioactivity in (*a*) decreased in the order (i) roots near the bases of the culms, (ii) roots coming from underground nodes, (iii) culms, whereas in (*b*) the order was (i) culm internodes, (ii) culm nodes and buds from the culm base, (iii) roots (no rhizome having yet formed). The extent of migration was unexpected, as it was studied between Jan. 19 and March 2 for (*a*) and March 9 to 26 for (*b*), i.e. during what is generally accepted as the dormant period.

2763. AHROMEJKO, A. I., and ŽURAVLEVA, M. V. Skorost' peredviženija vody u drevesnyh porod. **[The rate of water movement in woody species.]** *Sbornik Rabot po Lesnomu Hozjajstvu VNIILM* No. 32, 1956 (187–91). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (2), (No. 5666). [Russ.] H.S.B.

The rate of water flow in the xylem of Oak, Maple, Birch, Pine and 'Acacia' [*Caragana arborescens*?] was studied. Seedlings were dug up and their roots immersed for 10–60 min. in a solution containing 0·05 μ curies/ml. P^{32} or 2·5% heavy water. The rate of flow varied from 0 to 8 cm./min. for the different species; in good light, at a temperature of 23–26° C., the flow was more than twice as rapid as in poor light at 10–11°. Heavy water and P^{32} were transported at about the same rate. In summer there was an inverse relationship between leaf moisture and rate of water flow. Towards evening and towards the end of the growing season, the rate of flow decreased considerably. [Cf. *F.A.* 19 No. 78.]

2764. GEORGESCU, C. C., and NIȚU, G. Contribution à l'étude de la circulation de la sève chez le pin noir, sain ou en voie de desséchement. **[Sap circulation in healthy and dying *Pinus nigra*.]** *Rev. Biol., Bucarest* 2 (2), 1957 (201–14 + 12 photos). 4 refs. [F.] O.R.S.

A paper in French, substantially the same as that reported at *F.A.* 19 No. 80. No relation could be established between rate of sap flow and tree height, clean stem height and diameter, or total length, needle-covered length and diameter of branches.

2765. ERMICH, K. Zużycie wody przez drzewa i drzewostany jako pozycja rozchodowa w bilansie gospodarki wodnej. **[The transpiration of trees and stands in the water cycle.]** *Sylwan* 101 (6), 1957 (1–24). 48 refs. [Pol.]

Reviews mainly Russian [e.g. *F.A.* 14 Nos. 66–7; 15 No. 2260] and European [e.g. *F.A.* 7 No. 566; 16 No. 2624; 17 No. 2415] literature on the measurement of the amounts of water lost by transpiration of trees and stands.

2766. COUTINHO, L. M., and FERRI, M. G. Transpiração de plantas permanentes do cerrado na estação das chuvas. **[The transpiration of plants of the [campo] cerrado in the rainy season.]** *Revista Brasileira de Biologia, Rio de Janeiro* 16 (4), 1956 (501–18). 18 refs. [Port.port.e.] I.I.E.

Graphs air temperature and r.h., and transpiration rates of *Stryphnodendron adstringens*, *Platypodium elegans* and *Bowdichia virgiloides*, and gives data on the speed and efficiency of their stomatal reactions.

2767. PAVLETIĆ, Z., and LIETH, H. Der Lichtkompensationspunkt einiger immergrüner Pflanzen im Winter und im Frühjahr. **[The compensation point of some evergreen plants in winter and in spring.]** *Ber. dtsch. bot. Ges.* 71 (8), 1958 (309–14). 9 refs. [G.g.] O.B.D.

In winter 1957–58 and spring 1958, seven coniferous and four evergreen broadleaved species were studied for the frost-sensitivity of their assimilatory systems, the compensation point being taken as its measure. The relatively mild frosts of the winter (only to − 9° C.) had more effect on the conifers, among which *Picea abies* and *Sequoia gigantea* proved the most frost-resistant and *Abies alba* the most sensitive. In most species tested, the light intensity at which the compensation point is reached is lowered in the spring.

2768. NAUGOL'NYH, V. N. K fiziologii razdel'nopolyh rastenij. **[On the physiology of dioecious plants.]** *Bot. Ž.* 43 (11), 1958 (1562–71). 46 refs. [Russ.e.]

Respiration measurements on leaves of *Acer negundo* (and some non-woody dioecious species) showed that the respiration rate was not dependent on sex but on position of the leaves, rate of growth and age of the plant. Some Russian and European literature on other physiological processes in dioecious plants is briefly discussed.

2769. BOURDEAU, P. F. **Photosynthetic and respiratory rates in leaves of male and female Quaking Aspens.** *For. Sci.* 4 (4), 1958 (331–4). 7 refs.

Measurements under uniform conditions on fully developed leaves of 6 *Populus tremuloides* clones of each sex showed that the average respiration rate was 37% higher in leaves of ♀ plants, whereas net photosynthesis and chlorophyll content were respectively 10% and 14% lower than in ♂ plants. Surface area, water and N content and weight/unit area were similar for leaves of both sexes. *From author's summary.*

2770. SAEKI, T., and NOMOTO, N. **On the seasonal change of photosynthetic activity of some deciduous and evergreen broadleaf trees.** *Bot. Mag., Tokyo* 71 (841/842), 1958 (235–41). 13 refs. [E.e.]. I.M.I.

[Cf. *F.A.* 19 No. 3817.] Laboratory measurements of (*a*) photosynthetic activity, (*b*) respiration, (*c*) compensation point, (*d*) leaf weight, (*e*) dry matter produced and (*f*) chlorophyll content, were made on the leaves of the deciduous *Zelkova serrata*,

and the evergreens *Shiia sieboldii*, *Pittosporum tobira*, and *Cinnamomum camphora*. In *Zelkova*, (*a*) increased rapidly from late spring to a maximum of 5–6 mg. CO_2/50 sq. cm./hr., maintaining this level for 2·5 months and > half of this for ca. 4·5 months, each of which had mean temperatures of > 17° C. This activity ran fairly but only apparently parallel to (*f*), decreasing slowly until leaf-fall in November. The evergreens showed similar courses of (*a*) for the late spring and summer, but activity fell in autumn to a low level which held throughout the winter. Only in *Pittosporum* did (*a*) recover before the late spring leaf-fall. Younger leaves (clearly shown in the more active Lammas shoot) had higher (*b*) and (*c*) and lower (*a*) and (*f*). Leaf weight of *Shiia* and *Pittosporum* is ca. 180 g./sq. m., that of *Zelkova* ca. 90. For the replacement of their leaf-fall, the two former are estimated to require 30, the last 15, photosynthetically productive days. The evergreens easily accomplish this in southern districts with warmer winters. The advantages in competition and natural distribution are discussed.

2771. STANLEY, R. G., YOUNG, L. C. T., and GRAHAM, J. S. D. **Carbon dioxide fixation in germinating Pine pollen (*Pinus ponderosa*).** *Nature, Lond.* 182 (4647), 1958 (1462–3). 3 refs.

CO_2 fixation by plant tissues other than those involved in photosynthesis has recently been reported for whole plant tissues and cellular particulates of roots. This communication reports observations on the incorporation of CO_2 into the organic, amino-acid, and protein fractions of germinating Pine pollen.

2772. DUFF, G. H., and NOLAN, N. J. **Growth and morphogenesis in the Canadian forest species. III. The time scale of morphogenesis at the stem apex of *Pinus resinosa* Ait.** *Canad. J. Bot.* 36 (5), 1958 (687–707 + 4 plates). 15 refs. O.R.S.

[Cf. *F.A.* 19 No. 4645.] Four groups of meristematic cells in the main shoot apex were distinguished. The initiation and development of primordia in the bud and the timing of these events are described. The natural control of morphogenesis at the shoot apex, including the fitful seeding habit of *P. resinosa*, is considered in the light of the growth time-table. To explain its mechanism a working hypothesis involving production, consumption and concentration of auxins is advanced as a preliminary to future work.

2773. ALLEN, R. M. **A study of the factors affecting height growth of Longleaf Pine seedlings.** *Abstr. of thesis*, in *Dissert. Abstr.* 19 (4), 1958 (620). O.R.S.

The study was limited almost entirely to very young seedlings. Measurements of photosynthesis and respiration showed that Longleaf Pine seedlings have a lower rate per unit needle-weight than either Slash or Loblolly Pine seedlings, both of which, unlike Longleaf, make normal epicotyl elongation very early. Slash and Loblolly Pine epicotyls showed no major differences in the metabolites resulting from incubating the epicotyls in labelled glucose or succinic acid. Longleaf epicotyls were found to contain a much larger quantity of free amino acids than the other two species, although qualitatively there was little difference between the species at any of the development stages studied. Neither cold treatment nor change in day-length increased the growth of Longleaf seedlings, but two of the growth regulators studied, gibberellic triiodobenzoic acids, caused a small but consistent increase in epicotyl length. Paper-chromatographic studies of the ether-soluble acidic substances in seedling epicotyls and sapling buds showed at least 4 growth-promoting and one growth-inhibiting substances to be present in Pine; one of the growth-promoting substances was absent from extracts of non-elongating Longleaf Pine epicotyls.

2774. ALLARY, S. La libération d'auxine diffusible par les organes aériens des végétaux ligneux. **[The liberation of diffusible auxin by the aerial parts of woody plants.]** *C.R. Acad. Sci., Paris* 247 (23), 1958 (2187–9). 5 refs. [F.f.] O.R.S.

(1) In *Sambucus nigra* and *Viburnum opulus*, segments of shoots, with or without leaves, liberated diffusible auxin, but the isolated leaves failed to do so. (2) In *Fraxinus excelsior* and *Acer pseudoplatanus*, both isolated leaves and shoots liberated auxin. (3) In *Quercus robur*, no auxin was liberated, although ether extraction showed it to be present in the shoot.

2775. RICHARDSON, S. D. **The effect of IAA on root development of *Acer saccharinum* L.** *Physiol. Plant., Copenhagen* 11 (4), 1958 (698–709). 19 refs. [E.e.]

Experiments are described in which the terminal meristems of first-year seedlings of *A. saccharinum* growing in water cultures were replaced by heteroauxin in lanolin. Concentrations of 0·5 and 1% auxin more than overcame the inhibiting effect on root formation of removing the terminal meristem. The roots only elongated, however, on leafy seedlings; on defoliated ones, root elongation was suppressed. With seedlings growing in a humus-rich soil, however, root elongation was normal, whether leaves were present or not. There were no qualitative differences between seedlings growing in 4000 luxes and those in 250, indicating that the effect of defoliation was not due to carbohydrate deficiency. It is concluded that, apart from photosynthesis, root development is determined by at least two factors—one elaborated in the terminal meristem during the growing season, which controls root formation, its action being replaceable by artificial auxin, the other formed in the leaves and determining root elongation, which in the absence of leaves can be supplied by a humus-rich soil. It may be one of the B vitamins. *From author's summary.*

2776. PHILLIPS, I. D. J., and WAREING, P. F. **Studies in dormancy of Sycamore. I. Seasonal changes in the growth-substance content of the shoot.** *J. exp. Bot.* 9 (27), 1958 (350–64). 12 refs. O.B.D.

The growth substances present in buds and leaves of Sycamore (*Acer pseudoplatanus*) have been studied throughout the annual cycle in relation to the growth and dormancy of the shoot. Extracts made with 80% methanol from the apical region

and mature leaves were chromatographed and assayed with wheat-coleoptile sections, lettuce seeds, cress roots, and leaf-disks of Sycamore. An inhibitor was present in all extracts, running at ca. Rf 0·7 on chromatograms developed in isopropanol/ammonia. This was found to show various quantitative changes during the course of the year. Extracts of the apical region showed greatest inhibiting activity in the early winter, and least when active growth was taking place in May–June. There appeared to be a gradual decrease in inhibitor content of the terminal bud during the course of the winter. During late summer and early autumn the inhibitor content of the apex increased. Extracts of the mature leaves made during summer and autumn showed that the inhibitor content of the leaves increased until late August, and then decreased to zero. This latter change is thought to be associated with the senescence of the leaves prior to abscission. Indirect evidence suggests that the inhibitor is formed in the leaves and transported to the apex, where it accumulates. The inhibitor was found to inhibit the growth of Sycamore tissue itself. Growth-promoting activity was found on most of the chromatograms, and it was shown that this was attributable to sugar rather than auxin. *Authors' summary.*

2777. THORUP, S. **Breaking dormancy of Beech.** *Physiol. Plant., Copenhagen* 10 (4), 1957 (728–31). 7 refs. [E.e.]

Buds on branches and seedlings of *F. sylvatica* broke dormancy after treatment with 5 ml. Rindite (chlorhydrin, $C_2H_4Cl_2$, and CCl_4) applied during or after leaf-fall. In many cases adventitious buds developed before the primary buds opened, occasionally hampering the development of the latter. Some root growth was also observed.

2778. LONA, F., and BORGHI, R. **Sprouting of buds of *Fagus sylvatica* during the winter dormant period under short-day conditions by the action of gibberellic acid.** *Ateneo Parmense, Parma* 28, 1957 (116–8). [It.?] From *abstr.* in *Chem. Abstr.* 51 (13), 1957 (9801). P.R.

About 40% of Beech buds swelled when winter twigs were placed for 15 days in 1/20,000 gibberellic-acid solution, compared with 2% of similar buds from twigs in distilled water. The twigs were held at 17–19° [C.] for a 9-hr. period in the light and at 14–16° for the dark period.

2779. BRIAN, P. W., PETTY, J. H. P., and RICHMOND, P. T. **Effect of gibberellic acid on development of autumn colour and leaf-fall of deciduous woody plants.** *Nature, Lond.* 183 (4653), 1959 (58–9). 4 refs.

Gibberellic acid (g.a.) was applied as an aqueous spray (0·005% g.a., 0·01% 'Tween 20', 1·0% glycerol) on all leaves of a selected branch of each plant; a comparable branch was sprayed with the inert constituents of the spray fluid, but on no occasion did this control treatment produce any observable effect. The first application of spray was made on 11 Aug. 1958, and thereafter at weekly intervals. Little or no effect was noticed with *Acer rubrum, Castanea sativa, Fagus sylvatica, Quercus robur,* or *Ulmus procera.* Development of autumn colours and leaf abscission were delayed by g.a. in *A. pseudoplatanus, Betula verrucosa, Fraxinus excelsior, Liriodendron tulipifera, Parthenocissus tricuspidata, Prunus avium* and *Rhododendron* × *molle* cultivar. The most striking effects were noticed with *F. excelsior, P. avium* and *A. pseudoplatanus,* in which all leaves on treated branches were still quite green on 21 Nov., whereas all leaves from untreated branches had fallen. On the other hand, development of autumn colour and abscission of short shoots and leaves of *Taxodium distichum* was advanced by treatment with g.a. The leaves turned bronze in colour soon after the first treatment and all leaves on treated branches had fallen by 20 Oct., whereas bronzing of leaves on untreated branches was only beginning at that date and leaf-fall was only partial by 21 Nov. Shoot-extension had ceased in most of these plants at the time of the first treatment. Lateral and apical buds resumed activity and new shoots and leaves were formed as a result of treatment with g.a. in *A. pseudoplatanus, B. verrucosa* and *L. tulipifera.*

2780. BUKOVAC, M. J., and DAVIDSON, H. **Gibberellin effects on photoperiod-controlled growth of *Weigela*.** *Nature, Lond.* 183 (4653), 1959 (59–60). 3 refs.

Gibberellin applied to *Weigela* plants grown under a 9-hr. photoperiod induced growth of shoots and broke the photo-induced dormancy hitherto broken only after long photoperiods. It also accelerated the rate of growth under a photoperiod (18 hr.) conducive to continuous vegetative extension.

2781. SCHAEDLE, M. **Gibberellic acid application to Douglas Fir seedlings.** *For. Res. Rev. B.C. For. Serv. 1957/58,* 1958 (35).

The following treatments were applied as a spray to (*a*) < 1-year and (*b*) 1 + 0 Douglas Fir seedlings: (1) 50 c.c. of 125 p.p.m. gibberellic-acid solution, (2) 50 c.c. of 250 p.p.m., (3) 50 c.c. of 500 p.p.m., (4) 100 c.c. of 500 p.p.m. The (*b*) seedlings were sprayed on May 30 and (*a*) on July 25 after the emergence of secondary needles. Treatments (1)–(4) all reduced growth in (*b*) and induced early bud formation. No injurious effects were observed on (*a*).

2782. NICKELL, L. G. **Production of gibberellin-like substances by plant tissue cultures.** *Science* 128 (3315), 1958 (88–9). 11 refs. O.R.S.

Cultures whose extracts had a positive growth effect on dwarf pea plants, similar to that of the gibberellins, included one of callus tissues of the stem of *Ilex aquifolium.*

2783. MCWILLIAM, J. R., and MERGEN, F. **Cytology of fertilization in *Pinus*.** *Bot. Gaz.* 119 (4), 1958 (246–9). 13 refs. O.B.D.

Describes the cytology of the various stages during fertilization in *Pinus nigra,* and presents a photographic record of the sequence from the time when the two sperm nuclei enter the egg until the first two free nuclei of the zygote are formed.

163. Embryology

See also Nos. 2750–2, 2783.

2784. SASTRI, R. L. N. **Studies in Lauraceae. II. Embryology of *Cinnamomum* and *Litsea*.** *J. Indian bot. Soc.* 37 (2), 1958 (266–78). 13 refs. O.B.D.

2785. DNYANSAGAR, V. R. **Embryological studies in the Leguminosae. VIII. *Acacia auriculaeformis* A. Cunn., *Adenanthera pavonina* Linn., *Calliandra hematocephala* Hassk., and *Calliandra grandiflora* Benth.** *Lloydia* 21 (1), 1958 (1–25). 47 refs. P.R. [Cf. *F.A.* 19 No. 1371.]

164. Morphology

See also Nos. 2772, 2845, 2856, 2863, 2960, 3279, 3659, 3961.

2786. STERLING, C. **Dormant apical bud of *Agathis lanceolata*.** *Bot. Gaz.* 120 (1), 1958 (49–53). O.B.D.

2787. DELLINGSHAUSEN, M. VON, and STERN, K. Über einige besondere Blütenformen der Birke. **[Some special flower forms in Birch.]** *Silvae Genet.* 7 (6), 1958 (181–8). 16 refs. [G.g.e.f.]

Observations on abnormal flower development in Birch are presented and discussed with reference to literature already published. The following aspects are dealt with: androgynous and gynandrous flower development, the dependence of androgyny on site conditions, ♀ flowers, the behaviour of flowers in an artificially prolonged vegetative period, two cases of ♂ sterility, and two abnormal flower developments that are attributed to a shoot mutation. *From authors' summary.*

2788. CODACCIONI, M. Quelques aspects morphologiques de la floraison du châtaignier. **[Morphological aspects of the flowers of the Chestnut.]** *C.R. Acad. Sci., Paris* 247 (18), 1958 (1478–81). [F.f.] O.R.S.

Describes the two types of inflorescence, one carrying all ♂, the other ♂ and ♀ flowers, and the development of the tip of the inflorescences.

2789. ČERNJAVSKI, P. Anomalii cvetenija buka. **[Anomalies in the flowering of Beech.]** *Izv. Inst. Gorata bălg. Akad. Nauk., Sofia* No. 2, 1957 (371–83). 10 refs. [Russ.bulg.g.]

Notes the occurrence of abnormal inflorescences bearing flowers of both sexes in Beech stands in Bulgaria, in 1951 and 1955, years that had severe spring frosts and a wet summer.

2790. HORTON, J. S. **Inflorescence development in *Tamarix pentandra* Pallas (Tamaricaceae).** *Repr.* from *Southwestern Naturalist* 2 (4), 1957 (135–9). 9 refs.

2791. SAYED, M. D., and BEAL, J. L. **A histological study of some mucilaginous seeds.** *J. Amer. pharm. Ass.* (*sci. Ed.*) 47 (8), 1958 (544–7). 2 refs. O.R.S.

Describes the morphology and histology of the seeds of *Gymnocladus dioica*, *Gleditsia triacanthos* var. *inermis* and of sweet basil.

2792. PIJL, L. VAN DER. **On the arilloids of *Nephelium*, *Euphoria*, *Litchi* and *Aesculus*, and the seeds of Sapindaceae in general.** *Acta bot. neerland.* 6 (5), 1957 (618–41). 20 refs. [E.] O.B.D.

165.3/.7. Heredity, Genetics and Breeding; Variation

See also Nos. 2912–4, 2960, 3029, 3041–5, 3054–60, 3075, 3100.

2793. SHAFER, E. L., JR., and CHISMAN, H. H. **A selected bibliography on forest tree improvement.** Pennsylvania State University. [*n.d.*] pp. 49. 521 refs.

Confined to publications in English (mostly American) from forestry, botanical and abstracting journals, experiment-station publications and textbooks in the library of Pennsylvania State University up to ca. 1956, under the following main heads: Genetics; Selection; Pollination; Vegetative propagation; and General references, with an author index.

2794. DUFFIELD, J. W., and SNYDER, E. B. **Benefits from hybridizing American forest tree species.** *J. For.* 56 (11), 1958 (809–15). 43 refs.

A survey of N. American and European literature, yielding evidence that interspecific hybridization can, on occasion, increase both the adaptability and the pest-resistance of forest trees. The performance of some interspecific crosses involving American tree species is tabulated.

2795. **Proceedings of the fourth Southern conference on forest tree improvement.** Southeastern Forest Experiment Station, Asheville, N.C. 1957. pp. 149. Many refs.

The majority of the papers discuss Southern Pine, including the following: Hereditary variations in Slash Pine tracheids (*L. W. R. Jackson* and *J. T. Green*) [containing material additional to *F.A.* 20 No. 947]; Selecting drouth-resistant Loblolly Pine in Texas (*F. C. Cech* and *R. E. Goddard*); Physical and chemical characteristics of Loblolly Pine seedlings associated with drought resistance (*A. R. Gilmore*) [showing differences in transpiration rates and certain contents of sugars and minerals in stems, roots, and needles]; Age of tree and root development by air layers in Loblolly Pine (*R. G. McAlpine*) [indicating a sharp fall in successful rootings from 100% at 2 years to 7% at 10 and 0% thereafter]; Inoculation techniques in studies of rust resistance (*F. F. Jewell*). Other papers review the control of cone insects (*J. F. Coyne*); grafted seed orchards in the South (*C. W. Wang* and *T. O. Perry*); pollen handling (*E. B. Snyder*); rooting (*M. Reines*); grafting (*H. C. Grigsby*); and air-layering (*R. W. Johanson*). Two papers deal with propagation of hardwoods: rooting and air-layering experiments, successful and unsuccessful (*T. C. Nelson*); and rooting trials (*L. C. Maisenhelder*).

2796. DUFFIELD, J. W., and CALLAHAM, R. Z. **Deep-freezing Pine pollen.** *Silvae Genet.* 8 (1), 1959 (224). 5 refs. [E.e.g.f.]

Presents results of initial trials made at the Institute of Forest Genetics, California Forest and Range Experiment Station, in the storage of Pine

pollen in a domestic deep-freezer. Pollen stored for 10 months had about the same germinative capacity as fresh pollen. The % of sound seed obtained through controlled pollination with stored and with fresh pollen was also about the same. In two cases, seeds produced from pollination with stored pollen germinated as rapidly and produced seedlings as tall in the first year as did seedlings resulting from fresh pollen. In a third case, seeds from frozen pollen germinated 2 days later than those from fresh pollen. *From authors' summary.*

2797. ROHMEDER, E., and EISENHUT, G. Untersuchungen über das Mikroklima in Bestäubungsschutzbeuteln. **[Investigations into the microclimate inside pollination bags.]** *Silvae Genet.* 8 (1), 1959 (1–13). 10 refs. [G.g.e.f.]

Microclimatic conditions were studied in 3 types of bag used in artificial pollination, (1) polyethylene, (2) cloth, and (3) pergamine, with particular reference to the influence of the material, size of bag, and its angle and position in the crown. The effects of frost were investigated, and data collected on moisture conditions and gas exchange inside the bags. Methods of guarding against extremes of temperature are discussed, and a tabulated comparison of the 3 types of bag is presented. The use of homogeneous materials for bagging forest trees is not necessary, on account of the comparatively large size of the pollen grains. Usually a cloth bag with a mesh up to 20μ will do for conifers and one with a mesh up to 10μ for broadleaved species.

2798. WRIGHT, J. W., BINGHAM, R. T., and DORMAN, K. W. **Genetic variation within geographic ecotypes of forest trees and its role in tree improvement.** *J. For.* 56 (11), 1958 (803–8). 35 refs.

Reviews N. American and Scandinavian literature. The most reliable data on individual tree variation are from experiments on *Pinus sylvestris*, *Picea abies* and *Pinus monticola*, where the amount of genetic variation indicated is great enough to allow optimism as to the progress likely from intensive selection and breeding programs.

2799. SAMEJIMA, J. **[The selection in natural populations of *Abies sachalinensis* Fr. Schmidt.]** *Abstr.* in *Japanese Journal of Genetics, Tokyo* 33 (9), 1958 (322). [Jap.] O.R.S.

2800. MEYER, H. Hochharzfichten für Ziele der Forstpflanzenzüchtung. **[Using Spruce from high parts of the Harz Mts. in plant breeding.]** *Forst- u. Holzw.* 14 (4), 1959 (77–8). [G.]

Breeding and selection work with German variants of Spruce have indicated that one variant has outstanding resistance to snow- and ice-breakage. The variant can be distinguished, even when young, by the presence of glandular hairs on the pulvini. [Cf. *F.A.* 20 No. 146.]

2801. SCHISCHKOW [ŠIŠKOV], I. I. Phänotypen der Fichte. **[Phenotypes of Spruce.]** *Forst u. Jagd* 8 (10), 1958 (429–31). [G.] Transl. by F. Kügler [from Russian?] from 'Festschrift zum 150-jahrigen Bestehen des Versuchs- und Lehrrevieres Lisino'. *Veröffentlichung der Forstechnischen Kirow-Akademie* No. 73, 1956.

Describes, with a table of growth data, 5 phenotypes based on crown characters, in the Lisino forest of the Kirov Academy, and gives their % frequency in 3 local forest associations (sites described). The branch form is the easiest and most reliable criterion, that with moderately long, regular, comb-like branching being of the greatest silvicultural importance.

2802. MARTÍN BOLAÑOS, M., and VICIOSO MARTÍNEZ, C. Sección de botánica forestal y fitogeografía. Estudio de razas y variedades en los pinos españoles. **[Section for forest botany and phytogeography. Races and varieties in Spanish Pines.]** *An. Inst. for. Invest. Exp., Madrid* No. 2, 1957 (9–15 + 4 plates). [Span.]

Notes on the vegetation of the Sierras de Cazorla y Segura (Jaén), with particular reference to the Pines [cf. *F.A.* 19 No. 1411].

2803. FUKAREK, P. Die Standortsrassen der Schwarzföhre (*Pinus nigra* Arn. *sens. lat.*). **[Local races of *P. nigra*.]** *Cbl. ges. Forstw.* 75 (3/5), 1958 (203–7). 1 ref. [G.]

Presents a distribution map for the Balkan peninsula as a whole and for Bosnia and Herzegovina in particular, and also a map showing the proposed delimitation into 3 main groups, *laricio*, subdivided into *corsicana* and *calabrica*; *nigricans* (*austriaca*, *dalmatica*, and *illyrica*); and *pallasiana* (*pindica*, *balcanica* and *caramanica*) with *italica* and *banatica* as intermediate forms between *laricio* and *nigricans*, and *nigricans* and *pallasiana*, respectively. Within the form [*Sippe*] *illyrica* in Bosnia and Herzegovina, 4 local races are distinguished (continental, on serpentine or limestone, and submediterranean, on dolomite or limestone) whose role in karst afforestation will be discussed in a later paper.

2804. LEIBUNDGUT, H. Beitrag zur Rassenfrage bei der Schwarzföhre. **[A contribution to the problem of races of *Pinus nigra*.]** *Cbl. ges. Forstw.* 75 (3/5), 1958 (197–202). 2 refs. [G.]

Describes the effect of 8, 16, and 24 hours of illumination on early seedling development of 9 Jugoslavian, 3 Austrian, 1 Calabrian and 1 Corsican provenance, ranging from 39° to 48° lat. and from 150 to 1400 m. alt. While there were significant differences in length of hypocotyl between provenances and treatments (short days producing greatest lengths), the photoperiodic reaction of the provenances was less clear. The difference in effect between short and long day-lengths was, however, greatest for certain Jugoslavian mountain provenances. Effects of day length were in general less than with Scots Pine.

2805. HARM, H. Frühtest an *Pinus nigra* auf ihre Harzergiebigkeit. **[Early tests on the resin yield of *P. nigra*.]** *Allg. Forstztg.* 70 (3/4), 1959 (23–7). [G.g.]

Reports on 2 years' test results with 6-year-old open-pollinated progeny of high, medium and low-yielding trees. The mean yield per unit area of face for the high yielders' progeny was 70% better than that of the low. There was no correlation between yield per unit area and total weight of either woody

matter or foliage. [Cf. *F.A.* 17 No. 3988; 19 No. 2728.]

2806. Prokazin, E. P. Smoloproduktivnye formy sosny obyknovennoj. [**Forms of *Pinus sylvestris* with a high resin yield.**] *Lesn. Hoz.* 11 (4), 1958 (19–21). [Russ.]

Studies in various regions of Russia-in-Europe showed very wide variation in the resin yield of individual trees. Pines with a high resin yield are said to have shorter, more rigid, yellow-green needles, combined with differences in shape and colour of cone scales, blackish seeds of higher germinative energy, and a more ramified root system than poor resin-yielders. They have relatively more resin canals, and their turpentine has a relatively low sp. gr. and refractive index. They are also stated to be more resistant to diseases and insect pests. The progeny of trees with a high resin yield [population data not given] have shown a better developed secretory system, and better growth and survival, than those of poor resin-yielders. Accordingly, it is likely that selection for high resin yield by using seed from superior Pines would imply simultaneous selection for other desirable properties.

2807. Rossmässler. Die Hauptanbaugebiete und Rassen der Kiefer in Hessen. [**The main areas and races of *Pinus sylvestris* in Hesse.**] *Forst- u. Holzw.* 14 (4), 1959 (69–73). 7 refs. [G.]

Discusses the mountain and lowland races and the particularly recommended 'Landgräflich' type of lowland Pine in Hesse.

2808. Langlet, O. **A cline or not a cline—a question of Scots Pine.** *Silvae Genet.* 8 (1), 1959 (13–22). 23 refs. [E.e.g.f.]

Disputes the assertions of Wright and Baldwin [cf. *F.A.* 18 No. 2732] that variability in Scots Pine is discontinuous and not clinal, and asserts, on the basis of a study of the data published by these authors, that the variability in e.g. the dry-matter content of the needles and also in height measurement, is continuous and closely related to the length of the first day with a normal mean temperature of + 6° C. in the native habitats of the provenances.

2809. Schröck, O. Untersuchung der phototropischen Reaktion als Auslesemethode bei Kiefernsämlingen auf Gradschäftigkeit. [**A study of phototropic reaction as a method of selecting Pine seedlings for straightness of stem.**] *Züchter* 28 (7), 1958 (320–3). 4 refs. [G.] E.M.B.

Variations in phototropism with race [cf. *F.A.* 13 No. 81] are discussed. Techniques are described by which Pine seedlings grown in the dark until the hypocotyl is 2–3 cm. long are exposed to side lighting by a 2-amp., 220-volt bulb for 35 min. and then returned to the dark for a reaction period of 22 hr. The seedlings are photographed during their exposure to light and after the reaction period, and measurements are taken from the projected photographs. A formula to eliminate the effect of differences in hypocotyl length is presented, by which the angle of deflection of the hypocotyl if no lengthening had taken place during the reaction period, is calculated from the angles of deflection before and after and the hypocotyl lengths before and after the reaction period. An instrument for measuring the curved line representing hypocotyl length is described. In experiments with seedlings from trees selected for their superiority in quality and yield, and from progeny of such trees, the phototropic reaction was usually only slight, but some individuals produced both slightly reacting and more strongly reacting seedlings.

2810. Ehrenberg, C. E. Über Entwicklungsanomalien in Kreuzungsnachkommenschaften bei *Pinus silvestris* L. [**Abnormal progeny from cross-breeding of *P. sylvestris*.**] *Medd. SkogsforsknInst., Stockh.* 48 (2), 1958. pp. 14. 5 refs. [G.sw.*sw.*]

Analyses the occurrence of abnormal bud and shoot development (prolepsis, fasciation, forkings, etc.) in the progeny of 4 plus with 5 minus trees. Malformations, poor form and poor growth were more frequent when one parent was a minus tree, suggesting that the selection of trees for breeding by phenotype is sound practice.

2811. Schütt, P. Veränderung der Holzeigenschaften durch Züchtung—dargestellt an Untersuchungsergebnissen mit Kiefernarten. [**Changing wood properties by breeding, exemplified by research on *Pinus* spp.**] *Allg. Forstzeitschr.* 14 (4), 1959 (66–9). 17 refs. [G.]

A review, based largely on American sources, dealing with specific gravity, lignin and cellulose content, fibre length, etc.

2812. Squillace, A. E., and Bingham, R. T. **Selective fertilization in *Pinus monticola* Dougl.** *Silvae Genet.* 7 (6), 1958 (188–96). 15 refs. [E.e.g.f.]

Tests were made to determine whether any selective fertilization occurred when pollen of a given Western White Pine was in competition with that of another tree of the same species. Matings were made between two trees A and B, as follows: A × A, A × B, A × (A + B). In the last-named experiment pollens from the two parents (A + B) were mixed in equal proportions. Differences in early growth rate among the resulting one-year-old progenies were used as the main basis for estimating the degree of selective fertilization. In a moderately self-fertile tree, crossing exceeded selfing; in a highly self-fertile tree, crossing exceeded selfing when its own pollen was mixed with that from one tree, while with that from another the reverse was true. The results suggest that in stands under natural pollination conditions, crossing largely exceeds selfing. Conditions in seed orchards may differ and remain to be investigated. *From authors' summary.*

2813. Libby, W. J. **The backcross hybrid Jeffrey x (Jeffrey x Coulter) Pine.** *J. For.* 56 (11), 1958 (840–2). 6 refs.

Pollen from natural hybrids of *Pinus jeffreyi* × *P. coulteri* was back-crossed to *P. jeffreyi* to produce stock for use on sites in N.E. California where Pine reproduction weevils (*Cylindrocopturus eatoni*) are a pest. In the first 10 years of field trials

the back-cross hybrid has proved superior to *P. jeffreyi* in weevil resistance, survival, and growth rate etc., but has been outgrown by *P. coulteri* which, however, is more susceptible to cold and has possibly less desirable form and an early deceleration of growth rate. It is not yet known how the hybrids will behave in respect of these characters.

2814. GRIGSBY, H. C. **Two promising Pine hybrids for the Mid-South.** *Sth. Lumberm.* 198 (2466), 1959 (32–3).

Briefly discusses preliminary results of tests at the Crosset Experimental Forest, Arkansas. Slash Pine × Shortleaf Pine crosses showed greater resistance to *Rhyacionia frustrana* than Shortleaf Pine, and grew ca. 50% faster. A Loblolly × South Florida Slash Pine (*Pinus elliottii* var. *densa*) hybrid was completely resistant to *R. frustrana.*

2815. IRGENS-MOLLER, H. **Genetic variations in length of active growth period among races of Douglas-Fir, *Pseudotsuga menziesii* (Mirb.) Franco.** *Abstr. of thesis*, in *Dissert. Abstr.* 19 (4), 1958 (645). O.R.S.

[Cf. *F.A.* 18 No. 3768.] Discusses the response of seedlings from sources of different altitude to short and long photoperiods, and the effect of photoperiod length on frost-hardiness.

2816. IRGENS-MOLLER, H. **Genotypic variation in the time of cessation of height growth in Douglas Fir.** *For. Sci.* 4 (4), 1958 (325–30). 11 refs.

Greenhouse experiments with Douglas Fir seed collected from different localities in Oregon and British Columbia in 1957 showed that plants from seed from a coastal climate stopped height growth 1–4 weeks later, and were much taller at the end of the growing season, than plants from seed from interior B.C. or from a high altitude. In photoperiod experiments in Feb.–May, the average number of needles was almost the same for plants treated to a 10½-hour daylength with a 1½-hour 'light-break' after 6 hours, as for plants treated to 19 hours' continuous light, indicating periodicity rather than the total amount of light to be the governing factor. The plants from interior B.C. showed the greatest differences between responses to photoperiod treatment, and they remained completely dormant when treated to a continuous 9-hour photoperiod, while plants from seed from coastal regions showed active growth. Differences both in responses to treatment and between sources were significant at the 5% level.

2817. VÁCLAV, E. Sběr, zakličování a usklad ňování pylu břízy (*B. verrucosa* Ehrh.). **[The collection, germination and storage of *Betula verrucosa* pollen.]** *Sborn. čsl. Akad. zeměd.* (*Lesn.*) 4 (11), 1958 (939–70). 20 refs. [Cz.cz.russ.e.]

As part of a hybridization study, the influence of time of collection, the method of germination, and method of storage of Birch pollen was investigated in 1955 and 1956. It was found that the best time to collect is when individual pollen grains begin to be wind-borne, i.e. just before general pollination begins. Best germination was obtained from a 10% sucrose solution in distilled water, or a 0·0005% solution of Na tetraborate. Viability was preserved longest by putting the pollen in a desiccator over $CaCl_2$ and keeping at 0° C. If the pollen is to be used within 3 weeks of collection, storage at 0° without a desiccating agent will suffice.

2818. EIFLER, I. Kreuzungen zwischen *Betula verrucosa* und *Betula pubescens.* **[Crosses between *B. verrucosa* and *B. pubescens.*]** *Züchter* 28 (7), 1958 (331–6). 15 refs. [G.g.] E.M.B.

Examination of 258 of the 418 two-year-old progeny of controlled crosses of a single tree of *B. verrucosa* as the mother tree, with 6 trees of *B. pubescens*, showed that 66 seedlings had a chromosome count of $2n = 42$, and that this was probably true of a further 176 individuals. For the other 16 seedlings, the count was slightly above or below 42. The material has not yet been completely examined, but leaf shape (illustrated) suggests that the seedlings not yet examined cytologically are also hybrid forms.

2819. KRAEVOJ, S. JA. Bystryj rost i rannee plodonošenie duba čereščatogo. **[Rapid growth and early fruiting of *Quercus robur*.]** *Lesn. Hoz.* 11 (6), 1958 (78). [Russ.]

Some Oaks in shelterbelts on light-chestnut soils in the Ergeni Hills grew faster and fruited earlier than others. It was noted that these better trees had grown from the acorns that were the first to germinate. It is believed that the seed stand included two forms of *Q. robur*, and the possibilities are discussed of using fast germination as an indicator of rapid growth and early fruit-bearing.

2820. SMIRNOVA, V. A. Harakter razvitija odnoletnyh sejancev ėkotipov duba čereščatogo v uslovijah vegetacionnogo opyta. **[The development of first-year seedlings of *Quercus robur* ecotypes in pot trials.]** *Sbornik Naučnyh Rabot po Lesnomu Hozjajstvu, Institut Lesa Belorusskoj SSR* No. 7, 1956 (121–38). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (2), (No. 5912). [Russ.] H.S.B.

In greenhouse pot trials, first-year seedlings grown from acorns of (*a*) early flushing forms of *Q. robur* showed better general vigour and, when given adequate nutrient and moisture supplies, faster growth and more Lammas shoots than (*b*) seedlings of late flushing forms. In (*b*) the root system developed more strongly than the aerial parts, the leaves had denser venation and more numerous and smaller stomata; these seedlings were more intolerant of shade than (*a*).

2821. JOVANOVIĆ, S. Prirodna hibridizacija između topola × *P. marilandica* i × *P. serotina.* **[Natural hybridization between *Populus* x *marilandica* and *P.* x *serotina.*]** *Topola, Beograd* No. 4, 1957 (294–7). [Serb.]

Records a case in Jugoslavia of presumed natural fertilization of *P.* × *marilandica* by *P.* × *serotina* (no other ♂ trees existed within a radius of 4–5 km.), and recommends planting these varieties in mixture to form a source of hybrid seed for progeny trials.

2822. MERGEN, F. **Natural polyploidy in Slash Pine.** *For. Sci.* 4 (4), 1958 (283–95). 16 refs.

Abnormal *Pinus elliottii* seedlings collected from the Florida State nursery in 1952–57 occurred with frequency of 0·0002%. Data, with illustrations, are given on the growth (to ⩾ 3 years), needle anatomy and chromosome counts of 5 mixoploid seedlings which resulted from chromosome duplication after fertilization. These mixoploids have little forestry value, as their shoot and root growth are suppressed, and survival is therefore poor, and they are probably unable to form reproductive tissues with balanced chromosome numbers.

2823. HAIR, J. B., and BEUZENBERG, E. J. **Contribution to a chromosome atlas of the New Zealand flora. I.** *N.Z. J. Sci.* 1 (4), 1958 (617–28).

Deals with the 20 species of endemic Coniferae, giving a table showing the chromosome numbers of each species, referred to herbarium material, with photographs and drawings showing the first metaphase of meiosis, and drawings of the metaphase of mitosis.

2824. RATTENBURY, J. A. **Chromosome numbers of New Zealand Angiosperms.** *Transactions of the Royal Society of New Zealand, Wellington* 84 (4), 1957 (936–8). O.R.S.

Listed for 46 mainly indigenous species, including *Elaeocarpus hookerianus*, and 11 species of Araliaceae.

2825. WRIGHT, J. W. **New chromosome counts in *Acer* and *Fraxinus*.** *Morris Arboretum Bulletin Philadelphia, Pa.* 8 (2), 1957 (33–4). E.R.

Counts are given for *A. buergerianum*, *A. cappadocicum*, *A. henryi*, *A. macrophyllum*, *A. mayrii*, *A. negundo* and *A. platanoides*, and for *F. americana*, *F. anomala*, *F. bungeana*, *F. chinensis*, *F. latifolia*, *F. longicuspis*, *F. nigra*, *F. ornus*, *F. pubinervis*, *F. spaethiana*, *F. tomentosa*, *F. velutina*, and *F. v.* var. *coriacea*. Of the 29 *Acer* spp. for which the chromosome number is known, 24 are diploid ($2n = 26$) and of the remainder *A. platanoides* is diploid or triploid, *A. pseudoplatanus*, *A. carpinifolium* and *A. saccharinum* are tetraploid, *A. rubrum* is hexaploid and octoploid. Of the 20 *Fraxinus* spp. with known chromosome numbers, 16 are diploid with $2n = 46$, and the others polyploid, or diploid and polyploid (*F. americana* $2n = 46$, 92 and 138, *F. chinensis* $2n = 92$ and 138, *F. tomentosa* $2n = 138$, *F. velutina* $2n = 46$ and 92).

2826. RAGHAVAN, R. S., and AMORA, C. M. **Chromosome numbers in Indian medicinal plants—II.** *Proc. Indian Acad. Sci.* 47*B* (6), 1958 (352–8). 13 refs. O.R.S.

The 31 species examined included some trees and shrubs, e.g. *Ceriops candolleana*, *Sterculia urens*, and *Avicennia alba*.

2827. FAVRE-DUCHARTRE, M. Certains effets de la colchicine sur les ovules de *Cephalotaxus drupacea*, *Taxus baccata* et *Ginkgo biloba*. **[Some effects of colchicin on the ovules of *C. drupacea*, *T. baccata* and *G. biloba*.]** *C.R. Acad. Sci., Paris* 247 (14), 1958 (1029–31). 4 refs. [F.f.] O.R.S.

166. Economic Botany (General)

See also section 892.

2828. HEGNAUER, R. **Distribution of cyanogenesis in cormophytes.** *Pharmaceutisch Weekblad, Amsterdam* 93, 1958 (801–19). [Du.? e.] From *abstr.* in *Chem. Abstr.* 52 (22), 1958 (20448). P.R.

Of 399 species examined, 29 showed cyanogenesis, including *Taxus cuspidata*, *T. media* and *Prosopis iuliflora*.

168. Histology

See also Nos. 2786, 2791, 3654 *et seq.*, 3961.

2829. JACQUIOT, C. Recherches sur la rhizogenèse chez le tissu cambial de *Populus tremula* L. cultivé *in vitro*. **[Rhizogenesis in cambial tissue of *P. tremula* grown *in vitro*.]** *C.R. Acad. Sci., Paris* 247 (18), 1958 (1489–92). 3 refs. [F.f.] O.R.S.

In vitro cultures from 3 Aspens from different parts of France showed that the ease of rooting cuttings of a clone is in direct relation to the ease of root formation by cambial tissue. Tissue that does not readily form roots can be stimulated by the proximity of one that does.

17. Systematic Botany

172.8. Eumycetes (True Fungi)

See also Nos. 3323 *et seq.*, 3848 *et seq.*

2830. **Bibliography of systematic mycology 1957.** Commonwealth Mycological Institute, Kew. 1958. pp. 41. More than 800 refs. Price 7*s.* 6*d.*

2831. CUNNINGHAM, G. H. **Thelephoraceae of New Zealand. IX. The genus *Stereum*. X. The genera *Cytidia* and *Aleurocystis*. XI. The genus *Aleurodiscus*. XII. The genera *Thelephora* and *Tomentella*. XIII. The genus *Coniophora*.** *Transactions of the Royal Society of New Zealand, Wellington* 84 (2), 1956 (201–68 + 4 plates); 84 (3), 1957 (479–96). 48 refs. O.R.S.

2832. VLASOV, A. A. Dva vida mučnistoj rosy. **[Two species of *Microsphaera*.]** *Lesn. Hoz.* 10 (2), 1957 (28). [Russ.]

Describes the differences between *M. alphitoides*, and *M. silvatica*, discovered by the author in 1954–55 in the U.S.S.R. *M. silvatica* is the less dangerous.

2833. RICHTER, H., and GERLACH, W. Über die Typus-Art der Gattung *Cylindrocarpon* Wr. und ihre *Nectria*-Hauptfruchtform. **[The type species of *Cylindrocarpon* and its perfect *Nectria* stage.]** *Tijdschr. PlZiekt.* 64 (5/6), 1958 (392–5 + 1 plate). 5 refs. [G.du.] E.M.B.

Fungus material collected from *Abies alba* in the Vosges, when cultured, gave rise to both *C. cylindroides* and the perfect form *N. cucurbitula*. A similar correspondence had been found in the U.S.A. in 1931.

174. Spermatophyta, Seed-Plants in General. Floras and Check-Lists

See also Nos. 2979–80, 2997–8.

2834. BOOM, B. K. Benaming, geschiedenis en kenmerken van een aantal houtachtige planten.

[Nomenclature, history, and characteristics of some woody plants.] *Mededelingen, Instituut voor de Veredeling van Tuinbouwgewassen, Wageningen* No. 97, 1957. pp. 124 + 4 plates. Many refs. [Du.e.]

Summarizes this information for 165 dicotyledonous tree and shrub species, cultivars or hybrids originated in the last 20 years, and others cultivated in Holland but not found in Rehder's Manual of Cultivated Trees and Shrubs. The revised International Code of nomenclature for cultivated plants is followed, involving certain changes in names. Individual English summaries are given for the more important entries.

2835. SOKOLOV, S. JA. [Editor]. Derev'ja i kustarniki SSSR, dikorastuščie, kul'tiviruemye i perspektivnye dlja introdukcii. **[Trees and shrubs of the U.S.S.R.—native, cultivated or promising for introduction.]** Akademija Nauk SSSR, Moscow & Leningrad. Vol. IV, 1958. pp. 973. 6 pp. of refs. [Russ.]

[Cf. *F.A.* 18 No. 133.] Covers the dicotyledons from Leguminosae to Punicaceae.

2836. TOLMAČEV, A. I. Derev'ja, kustarniki i derevjanistye liany ostrova Sahalina. Kratkij opredelitel'. **[The trees, shrubs and woody climbers of the island of Sakhalin. A short key.]** Akademija Nauk SSSR, Moscow & Leningrad. 1956. pp. 171. [Russ.]

Covers 179 species (34 families) including some commonly cultivated exotics as well as native species.

2837. STEWART, R. R. **The flora of Rawalpindi district, West Pakistan.** *Pakistan J. For.* 7 (4), 1957 (237–300); 8 (1), 1958 (13–111).

2838. ROBYNS, W. Flore du Congo belge et du Ruanda-Urundi. Spermatophytes. Tableau analytique des familles. **[Flora of the Belgian Congo and Ruanda-Urundi. Spermatophytes. Key to the families.]** Institut National pour l'Étude Agronomique du Congo Belge (I.N.É.A.C.), Brussels. 1958. pp. 69. 8 refs. [F.]

2839. HUBBARD, C. E., and MILNE-REDHEAD, E. [Editors]. **Flora of tropical East Africa. Melianthaceae.** Crown Agents for Oversea Governments and Administrations, London. 1958. pp. 7. Price 1*s.* 6*d.*

Bersama rosea, B. abyssinica and its subspecies and varieties.

2840. VATTIMO, I. DE, BARROSO, G. M., and GOMES, J. C. Flora do Itatiaia. **[Flora of Itatiaia [, Brazil].]** *Rodriguésia* 20 (32), 1957 (27–61, 65–88, 111–29, 175–241). Many refs. [Port.]

2841. BRIZICKY, G. K., STERN, W. L., and CHAMBERS, K. L. **A collection of woody plants from Panama.** *Trop. Woods* No. 109, 1958 (61–80).

Scientific and native names, descriptive notes, uses etc., with some taxonomic data for 158 species (some new or first records) covering 50 families. *Ochroma pyramidale* (Cav. ex Lam) Urb., appears to have priority over *O. lagopus* Swartz.

2842. CURTIS, W. M. **The student's flora of Tasmania. Part I. Gymnospermae. Angiospermae: Ranunculaceae to Myrtaceae.** Government Printer, Hobart, Tasmania. 1956. pp. xlvii + 234. Price 14*s.*

2843. STONE, B. C. **The flora of Namonuito and the Hall Islands [Caroline group].** *Pacif. Sci.* 13 (1), 1959 (88–104). 8 refs. E.M.B.

Describes the probable natural ecological zones (strand forest, *Pisonia* forest, intermediate forest, Coconut and Breadfruit forest and swamp), the island economy, and the individual islets, and gives a key to the species, with a checklist.

174.2/.7. Gymnosperms

See also Nos. 2800, 2803, 2960, 3647, 3669, 3672.

2844. AHLGREN, I. F., and AHLGREN, C. E. **A key to the native coniferous tree seedlings of the Quetico-Superior area [N. Minnesota].** *J. For.* 56 (12), 1958 (911–2). 1 ref.

Presents morphological characters (including cotyledon number and size) to distinguish seedlings of *Thuja occidentalis, Tsuga canadensis, Pinus banksiana, P. strobus, P. resinosa, Abies balsamea, Larix laricina, Picea glauca* and *P. mariana.*

2845. MARCELLIN-SYLVIO, F. E. C. Pollen des épinettes du Québec et leur diagnose. **[The pollens of *Picea* spp. in Quebec and their identification.]** *Abstr.* in *Ann. ACFAS* 23, 1957 (98). [F.] L.S.

2846. BANNISTER, M. H. **Specimens of two Pine trees from Guadalupe Island, Mexico.** *N.Z. J. For.* 7 (5), 1958 (81–7). 2 refs.

Seeds and specimens of two Pine trees on Guadalupe Island and a herbarium specimen of one of them, reached New Zealand in April 1958. In some of its morphological characters the herbarium specimen resembles *Pinus remorata* but in others it seemed to be identical with *P. radiata.* It is concluded, with some reservations, that both trees should be referred to *P. radiata* var. *binata.*

175.2. Monocotyledons

2847. HOLTTUM, R. E. **The Bamboos of the Malay Peninsula.** *Gdns'. Bull.* 16, 1958 (1–135).

Includes a general account of the morphology, physiology etc. of Bamboos, keys to Malayan genera, and detailed descriptions of species, with 6 new varieties.

176.1. Dicotyledons

See also Nos. 2900, 2949, 3657–63.

2848. PÉNZES, A. **Data on the ecology and taxonomy of the *Cotinus* genus.** *Acta bot. sinica* 7 (3), 1958 (165–9 + 4 plates). 4 refs. [Chin.E.]

Discusses the ecology of *C. coggygria* in Hungary, where it is a pioneer on bare stony soils, and assists afforestation. Also distinguishes, on the basis of leaf form and pubescence, 4 species: *C. szechuanensis* sp. nov., *C. americanus, C. velutina* and *C. coggygria,* and 6 varieties of the latter. Three of the varieties are new: *C.c.* var. *pseudo-coggygroides, C.c.* var. *ovalifolia,* and *C.c.* var. *bakonyensis.*

2849. CABRERA, A. LULIO. Compositae brasilienses novae. [**New Brazilian Compositae.**] *Arquivos do Jardim Botânico do Rio de Janeiro* 15, 1957 (71–85). [Port.]

Includes the description of a new tree species, *Piptocarpha graciellae.*

2850. KERAUDREN, M. Notes sur les Cornacées de Madagascar. [**Notes on the Cornaceae of Madagascar.**] *Bull. Soc. bot. France* 105 (5/6), 1958 (250–4). [F.] O.B.D.

Describes some new species of *Melanophylla.*

2851. DILMY, A. **A new species of *Anisoptera* (Dipterocarpaceae).** *Reinwardtia, Bogor* 3 (3), 1956 (347–9). [E.latin] L.S.

Describes and illustrates *Anisoptera kostermansiana* sp. nov., found in New Guinea.

2852. SMITINAND, T. [**The identification of some *Dipterocarpus* species.**] , *Vanasarn* 16 (3), 1958 (87–9). [Siam.e.]

Lists 6 field characters distinguishing *D. costatus* from *D. turbinatus.*

2853. SLOOTEN, D. F. VAN. **Sertulum Dipterocarpacearum Malayensium—VI. Twelve species of *Shorea* of the *Balanocarpus* type.** *Reinwardtia, Bogor* 3 (3), 1956 (315–46). [E.e.] L.S.

[Cf. *F.A.* 12 No. 1833.] *Balanocarpus* is given up, as an artificial genus, many of its species being referable to *Shorea.* Taxonomic descriptions and extensive notes are given on 5 known species: *Shorea multiflora, S. richetia, S. peltata, S. balanocarpoides* and *S. xanthophylla,* and 7 new species: *S. laxa, S. dolichocarpa, S. conica, S. obovoidea, S. subcylindrica, S. induplicata* and *S. collaris.*

2854. MUŠEGJAN, A. M. Loh uzkolistnyj ilijskij. [***Elaeagnus angustifolia* var. *iliensis* var. nov.**] *Lesn. Hoz.* 11 (5), 1958 (74). [Russ.]

Describes briefly a new variety found in the flood meadows of the Charyn (a tributary of the River Ili, Kazakhstan). Its stem is larger (height 20 m., d.b.h. 110 cm.), and the fruits too are larger than those of *E. angustifolia.* A sample felled tree was 18·4 m. high, and 58 cm. in diam., at 43 years; its m.a.i. and c.a.i. are shown in a graph.

2855. **New and interesting records of African flowering plants.** *Bothalia* 7 (1), 1958 (21–39).

Includes *Euphorbia cussonioides* Bally, sp. nov., a 20- to 25-m. tree of the Kenya Highlands, with soft, white, even-grained timber possibly suitable for matches; and *Zizyphus rivularis* Codd, sp. nov., from Transvaal and Mozambique.

2856. CHANG, C.-T. [**Morphological characteristics of the pollen of contemporary and some fossil species of *Liquidambar*.**] *Acta bot. sinica* 7 (4), 1958 (215–30 + 56 drawings, 53 photos). 17 refs. [Chin.russ.]

Describes and illustrates the pollen of *L. orientalis, L. formosana* and *L. styraciflua,* constructing a key based on pollen characteristics. Also discusses fossil material of the genus in the U.S.S.R., and the conflicting Russian theories on the history of the genus since the Eocene.

2857. KOSTERMANS, A. J. G. H. **Lauraceae.** *Reinwardtia, Bogor* 4 (2), 1957 (193–256). Many refs. [E.e.] L.S.

Attempts to classify the Lauraceae into taxa down to the rank of subgenus, discusses characters and their taxonomic value, and recognizes two new subfamilies: Lauroideae and Cassythoideae, as well as several new tribes, subtribes and subgenera, and surveys the 3 accepted genera, with synonyms, typification, description and particulars. *From author's summary.*

2858. VATTIMO, I. DE. 'Lauraceae' do Estado do Rio de Janeiro. [**Lauraceae of the state of Rio de Janeiro.**] *Arquivos do Jardim Botânico do Rio de Janeiro* 15, 1957 (113–59). [Port.]

Describes species of *Aiouea, Beilschmiedia, Cryptocarya, Endlicheria, Licaria, Mezilaurus, Urbanodendron, Phoebe* and *Ocotea.*

2859. CODD, L. E. **The *Albizzia* species of South Africa.** *Bothalia* 7 (1), 1958 (67–82). Many refs. in text.

A systematic review, with a key to and descriptions of the 11 indigenous and 2 introduced species of *Albizzia.*

2860. GILBERT, G., and BOUTIQUE, R. *Newtonia devredii,* une Mimosacée nouvelle du Congo Belge. [***N. devredii*, a new species of the Mimosaceae from the Belgian Congo.**] *Bull. Soc. Bot. Belg.* 90 (2), 1958 (307–9). [F.] O.B.D.

2861. ALI, S. I. **Revision of the genus *Indigofera* L. from W. Pakistan and N.W. Himalayas.** *Bot. Notiser* 111 (3), 1958 (543–77). 62 refs. [E.] O.B.D.

A taxonomic study giving descriptions of two new species, *I. simlensis* and *I. himalayensis.*

2862. LEROY, J. F. Recherches sur les Meliaceae: le *Capuronianthus,* genre nouveau endémique à Madagascar, type de la tribu des Capuronianteae trib. nov., sous-famille des Carapoideae subf. nov. [**Studies on the Meliaceae: *Capuronianthus*, a new genus endemic to Madagascar, the type of the tribe Capuroniantheae trib. nov., sub-family Carapoideae subfam. nov.**] *C.R. Acad. Sci., Paris* 247 (17), 1958 (1374–6). [F.] O.R.S.

2863. JARRETT, F. M. **Studies in *Artocarpus* and allied genera, I. General considerations. II. A revision of *Prainea*.** *J. Arnold Arbor.* 40 (1), 1959 (1–37). 23 refs.

(I) An introductory paper reviewing the more general problems of the generic distinctions of *Prainea, Artocarpus, Parartocarpus* and *Hullettia,* for each of which full revisions will be given in subsequent parts. This part covers the morphology and development of the inflorescences, structure and germination of the seed, shoot morphology, leaf anatomy, distribution, and natural and artificial keys. (II) Includes descriptions of four species, trees 20–35 m. high (one a climber?) of lowland evergreen forests in Malaya, Sumatra, Borneo, Moluccas and New Guinea. The genus is restricted to Malaysia.

2864. SINCLAIR, J. **A revision of the Malayan Myristicaceae.** *Gdns'. Bull.* 16, 1958 (205–472 + 14 plates). 16 pp. of refs.

Includes descriptions of 10 new species and several new varieties.

2865. HOWARD, R. A. **Studies in the genus *Coccoloba*. VI. The species from the Lesser Antilles, Trinidad and Tobago.** *J. Arnold Arbor.* 40 (1), 1959 (68–93).

Includes a key to 15 species, of which 4 are shrubs or scandent trees and the others trees 6–27 m. high.

2866. BEARD, J. S. **The *Protea* species of the summer rainfall area of South Africa.** *Bothalia* 7 (1), 1958 (41–65). Many refs.

Describes 15 species, with keys to sections and species, including *P. dracomontana*, *P. parvula*, *P. rubropilosa* and *P. comptonii* spp. nov.

2867. JACQUES-FÉLIX, H. Les *Rhizophora* de la mangrove atlantique d'Afrique. **[*Rhizophora* spp. of the Mangrove swamps of the Atlantic coast of Africa.]** *J. Agric. trop. Bot. appl.* 4 (7/8), 1957 (343–7). 3 refs. [F.] P.O.

Discusses the occurrence and identification of *R. racemosa*, *R. mangle* and *R. harrisonii*.

2868. ARISTEGUIETA, L. El género *Symplocos* en Venezuela. **[The genus *Symplocos* in Venezuela.]** *Boletín de la Sociedad venezolana de Ciencias naturales, Caracas* 18 (88), 1957 (106–19). [Span.] From *abstr.* in *Suplemento Bibliográfico de Turrialba* 8 (2), 1958 (No. 271/58). [Span.] O.R.E.

Presents a key to the 15 species, based on flower and leaf characters. Describes the species, including *S. flos-pilosa* sp. nov., and *S. bolivarana* sp. nov.

2869. VUČETIČ, J. S. O savremenoj nomenklaturi topola. **[Contemporary Poplar nomenclature.]** *Topola, Beograd* No. 5, 1958 (333–56). 19 refs. [Serb.f.]

Describes recent activities of the FAO International Poplar Commission, and lists Poplar species, varieties and hybrids under their scientific names giving, where it exists, the Jugoslav name, and occasionally also the French, German or English name, with notes on distribution.

2870. MILOVANOVIĆ, M. Jedna žalosna crna topola na Omoličkom forlandu. **[A weeping Black Poplar at Omoličko Forland.]** *Topola, Beograd* No. 3, 1957 (205–9). [Serb.f.]

Describes, with a photograph, a specimen of *P. nigra* f. *pendula*, situated on the banks of the Danube, near Pančevo. It has a height of 14 m. and a d.b.h. of 112 cm. and has grown from a stump cut ca. 40 years ago. Morphological data are given. Attempts at vegetative propagation are being made.

2871. STEFANOV, B., and CIKOVA, E. Za čuždozemnite vidove topoli, otgleždani v Bălgarija. **[Exotic Poplar species cultivated in Bulgaria.]** *Izv. Inst. Gorata bălg. Akad. Nauk., Sofia* No. 2, 1957 (383–96 + 9 plates). 11 refs. [Bulg.russ.g.]

Distinguishes, by the morphological characters of coppice shoots, overwintering buds, and leaf-form at the end of the growing season (illustrated), the following species of the group *Aigeiros* introduced into Bulgaria: *Populus deltoides*, *P. nigra*, *P. nigra* var. *italica*, *P. tacamahaca*, *P. candicans*, *P. trichocarpa* and *P. przewalskii*.

2872. HAMAYA, T., and INOKUMA, T. **Native species of *Populus* in Japan.** Forestry Agency, Ministry of Agriculture, Tokyo. 1957. pp. 17 + 9 plates. Many refs. [E.jap.]

A description, with illustrations, of *P. sieboldii*, *P. tremula* var. *davidiana*, *P. jezoensis*, *P. maximowiczii*, and *P. koreana*, their taxomic status, varieties, nomenclature, habitats and uses.

2873. GORSCHKOVA [GORŠKOVA], S. G. **Salt Cedars (*Tamarix*, Tamaricaceae) of the Soviet Union.** *Southwestern Naturalist* 2 (2/3), 1957 (48–73). From *abstr.* in *Biol. Abstr.* 32 (5), 1958 (No. 17231).

Translation (with commentary) of the whole account of *Tamarix* in the Flora of the Soviet Union Vol. XV, 1949. In an appendix are given a key and notes on 7 taxa found in the southwestern U.S.A.

2874. **Country reports on Teak.** FAO, Rome. 1956. pp. 140 + 6 sketchmaps, 4 photos, 1 set of graphs. 219 refs. [E. or F.,e.]

National progress reports presented to the first session of the FAO Teak Sub-Commission in Bangkok, 1956, by Burma, France (for Dahomey and Togo), India, Indonesia, Japan, Laos, and Thailand. The bibliography refers almost entirely to Indonesia. [Cf. *F.A.* 17 No. 4659.]

18. Plant Ecology

See also No. 4024.

2875. DANSEREAU, P. **Biogeography. An ecological perspective.** The Ronald Press Company, New York. 1957. pp. xiii + 394. 18 pages of refs. Price £3. 0*s*. 0*d*. ($7.50.).

An exposition of the author's concept of biogeography as the study of the origin, distribution, adaptation and association of animals and plants; divided into 5 main chapters: History of biota; Bioclimatology; Synecology; Autecology; and Man's impact on the landscape, followed by an appendix describing and analysing 14 typical plant communities (including 5 *Acereta*) in the middle St. Lawrence valley [cf. *F.A.* 9 No. 157], and a glossary. Many examples and illustrations are taken from forestry contexts, particularly Candian and Brazilian.

2876. **Notes on a visit to the New South Wales White Cypress Pine [*Callitris glauca*] forests.** *Emp. For. Rev.* 37 (4), 1958 (434–9).

Notes on distribution and ecology.

181. Mode of Life, Autecology. Silvicultural Characters of Trees

See also Nos. 2848, 2961, 2974, 2997, 2999, 3031, 3211–2.

2877. WANG, C.-F., and FU, T.-M. **[Distribution, site characteristics and experience in the rearing of the main woody species in the western part of**

Shansi province.] *For. Sci., Peking* 1956 (2), (115–46). 3 refs. [Chin.]

A detailed study, with scientific names, small photos, root diagrams and a profile map, for *Pinus tabulaeformis*, *Thuja orientalis*, *Salix matsudana*, *S. purpurea*, *Populus hopeiensis*, *P. simonii*, *P. cathayana*, *Ulmus pumila*, *Robinia pseudoacacia*, *Ailanthus altissima*, *Catalpa bungei*, *Zizyphus jujuba*, *Tamarix iuniperina*, *Hippophaë rhamnoides*, and *Vitex chinensis*. [Cf. *F.A.* 20 Nos. 2937–8.]

2878. KOZDON, P. Las coníferas autóctonas y su progresiva desaparición en la Cordillera Andina. [**Native conifers and their progressive disappearance in the Andes.**] *Montes, Madrid* 14 (84), 1958 (463–72). 14 refs. [Span.]

The native coniferous forests of the Andes have been so reduced by over-exploitation that they now occupy only 5% of the total forest area in Chile and 3% in Argentina. They exist for the most part on unfavourable soils, while the more exigent broad-leaved species have replaced them on the better sites. The following important species are described, with notes on their silvicultural characters, distribution and importance: *Araucaria araucana*, *Libocedrus chilensis*, *L. tetragona*, *Fitzroya cupressoides*, *Saxegothaea conspicua*, *Podocarpus andinus*, *P. nubigenus*, *P. salignus* and *Dacrydium fonkii*. Natural regeneration of these species is practically nil, they are difficult to grow, and in any case offer little inducement to replant because of their slow growth. The only way to preserve the existing forests is by stricter legislation. [Cf. *F.A.* 18 No. 2562.]

2879. WARD, J. H. **Notes on the Cedar of Willowmore, *Widdringtonia schwarzii*.** *J. S. Afr. For. Ass.* No. 31, 1958 (81–4). [E.]

Describes the habitat, with notes on soil and climate, of this species native to the E. Cape Province and its habit, foliage, cones, and wood, including properties and uses. Attempts to grow it elsewhere have not been very successful, but seed sown at George in soil taken from the area, with the necessary mycorrhizal inoculation, has produced 1000 healthy seedlings.

2880. TRAPPE, J. M., and HARRIS, R. W. **Lodgepole Pine in the Blue Mountains of north-eastern Oregon.** *Res. Pap. Pacif. Nthwest. For. Range Exp. Sta.* No. 30, 1958. pp. 22. 14 refs.

Presents results of a study, started in 1956, on the ecology, growth and silvicultural characteristics of *Pinus contorta*, which covers ca. 400,000 acres in N.E. Oregon. Forage species in Lodgepole Pine stands, and damage by weather, insects and diseases are discussed briefly. As most stands are so overstocked that individual tree growth is seriously reduced, and as heavy mortality may be expected when stands reach 100 years, increased utilization is advisable.

2881. *Pinus caribaea* Morelet et *Pinus elliottii* Engelmann: caractères sylvicoles et méthodes de plantations. [***P. caribaea* and *P. elliottii*: silvicultural characters and plantation techniques.**] *Bois For. Trop.* No. 62, 1958 (21–7). [F.]

2882. CURSCHMANN, O. H. Die grosse Küstentanne (*Abies grandis*) in Mecklenburg. [***A. grandis* in Mecklenburg.**] *Forst u. Jagd.* 8 (6), 1958 (273–6). [G.]

Notes on its utilization (pulp); yield (greater than Douglas Fir); seed collection and nursery treatment; planting and silvicultural requirements; and vegetative reproduction.

2883. DIMOCK, E. J., II. **Silvical characteristics of Pacific Silver Fir [*Abies amabilis*].** *Silvic. Ser. Pacif. Nthwest. For. Range Exp. Sta.* No. 4, 1958. pp. 12. 27 refs.

2884. MAUL, D. C. **Silvical characteristics of White Fir [*Abies concolor*].** *Tech. Pap. Calif. For. Range Exp. Sta.* No. 25, 1958. pp. 22. 37 refs.

2885. STAEBLER, G. R. **Silvical characteristics of Noble Fir [*Abies procera*].** *Silvic. Ser. Pacif. Nthwest. For. Range Exp. Sta.* No. 5, 1958. pp. 12. 28 refs.

2886. HAYES, G. L. **Silvical characteristics of Port-Orford-Cedar [*Chamaecyparis lawsoniana*].** *Silvic. Ser. Pacif. Nthwest. For. Range Exp. Sta.* No. 7, 1958. pp. 11. 14 refs.

2887. RUTH, R. H. **Silvical characteristics of Sitka Spruce [*Picea sitchensis*].** *Silvic. Ser. Pacif. Nthwest. For. Range Exp. Sta.* No. 8, 1958. pp. 19. 25 refs.

2888. ISAAC, L. A., and DIMOCK, E. J. II. **Silvical characteristics of Douglas-Fir [*Pseudotsuga menziesii*] (var. *menziesii*) [*P. taxifolia*].** *Silvic. Ser. Pacif. Nthwest. For. Range Exp. Sta.* No. 9, 1958. pp. 18. 42 refs.

2889. GODMAN, R. M. **Silvical characteristics of Northern White-Cedar [*Thuja occidentalis*].** *Sta. Pap. Lake St. For. Exp. Sta.* No. 67, 1958. pp. 17. 44 refs.

2890. BERNTSEN, C. M. **Silvical characteristics of Western Hemlock [*Tsuga heterophylla*].** *Silvic. Ser. Pacif. Nthwest. For. Range Exp. Sta.* No. 3, 1958. pp. 16. 24 refs.

2891. SLABAUGH, P. E. **Silvical characteristics of Black Maple [*Acer nigrum*].** *Sta. Pap. Lake St. For. Exp. Sta.* No. 66, 1958. pp. 9. 19 refs.

2892. TARRANT, R. F. **Silvical characteristics of Pacific Madrone [*Arbutus menziesii*].** *Silvic. Ser. Pacif. Nthwest. For. Range Exp. Sta.* No. 6, 1958. pp. 10. 16 refs.

2893. LEAK, W. B. **Silvical characteristics of Sweet Birch [*Betula lenta*].** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 113, 1958. pp. 14. 48 refs.

2894. KRAJICEK, J. E. **Silvical characteristics of Hackberry [*Celtis occidentalis*].** *Misc. Release Cent. St. For. Exp. Sta.* No. 31, 1958. pp. 11. 34 refs.

2895. ROE, E. I. **Silvical characteristics of Balsam Poplar [*Populus balsamifera*].** *Sta. Pap. Lake St. For. Exp. Sta.* No. 65, 1958. pp. 17. 42 refs.

2896. ROACH, B. A. **Silvical characteristics of Black Locust [*Robinia pseudoacacia*].** *Misc. Release Cent. St. For. Exp. Sta.* No. 30, 1958. pp. 15. 49 refs.

2897. STEIN, W. I. **Silvical characteristics of California-Laurel [*Umbellularia californica*].** *Silvic. Ser. Pacif. Nthwest. For. Range Exp. Sta.* No. 2, 1958. pp. 16. 38 refs.

2898. CHOU, C.-H. **[Biological characters of *Eucommia ulmoides* and problems of plantation management in Kweichow.]** *For. Sci., Peking* 1958 (2), (129–48). 12 refs. [Chin.russ.]

Presents data on distribution and ecology. It is considered a useful species for water and soil conservation. Advice is given on plantation techniques. The 'nest' method is recommended.

2899. MONTEIRO, J. A. DA CUNHA. Ecologia do sobreiro. **[The ecology of Cork Oak.]** Estudos e Divulgação Técnica, Direcção Geral dos Serviços Florestais e Aquícolas, Lisbon. 1958. pp. 32. 29 refs. [Port.]

Deals with the distribution of *Quercus suber* in the Mediterranean and Atlantic regions, climate and soil, comparative distribution of other Oaks, particularly *Q. ilex*, associated vegetation, the regression of Cork Oak and its causes, and its regeneration and tending.

2900. CAMUS, A. Notes sur quelques Fagacées. **[Notes on some Fagaceae.]** *J. Agric. trop. Bot. appl.* 3 (1/2), 1956 (82–6). [F.] P.O.

Discusses the distribution of varieties of *Quercus coccifera*, and describes, with notes on their distribution, *Castanopsis mekongensis*, *C. incana*, *C. bejaudii*, *C. rockii*, *C. touranensis*, and *C. longipes*.

2901. HEJAZI, R., *et al.* **[Study on Plane-tree (*Platanus orientalis* L.) in Iran.]** *Bulletin, Forestry and Wood Technology Laboratory, University of Teheran* No. 16, 1959. pp. [30] + 24 gphs. 6 refs. [Per.e.*e.*]

Covers propagation, distribution, and uses of the tree in Persia, and results of investigations on the course of diameter growth of 24 specimens randomly selected from a population of 40 felled trees, and ranging in age from 57 to 140 years (46·8 to 107·5 cm. diam.). The widest annual ring observed was 15 mm., and the smallest 1 mm. The diameter increment of each tree is graphed, and it appears that the optimum age to exploit the trees is 70 years (mean diameter ca. 60 cm.).

2902. SHERRY, S. P. **Report on a tour of Black Wattle areas in Australia.** *Rep. Wattle Res. Inst. S. Afr. 1957/58*, 1958 (28–33).

A tour was made in Oct. and Nov. 1957 to study the behaviour of Black Wattle [*Acacia decurrens* var. *mollissima*] in its native habitat, as well as the sites on which it occurs, and to collect seed from trees of good type over the entire natural range of the species. An account is given of climate, soil types, distribution, insect pests and diseases, and associated *Acacia* spp. and *Eucalyptus* spp.

2903. YANG, Y.-H. **[The silvicultural characters of *Burretiodendron* and extension of cultivation.]** *For. Sci., Peking* 1958 (2), (149–55). 9 refs. [Chin. russ.]

Gives data on the silvicultural characters of *Burretiodendron*, a new subtropical genus of the Tiliaceae discovered by the Botanical Institute of S. China in 1955 in Lonchin district, Kwangsi Province, 4 species of which have so far been distinguished: *B. esquirolii*, *B. combretoides*, *B. hsienmu* and *B. obconicum*. They appear to be valuable for their timber, which is tough, hard and dense, with excellent mechanical properties and a high resistance to decay. They are suggested for use in shelterbelts. They are evergreen trees, reaching heights of > 20 m., and grow well on weakly acid to neutral soils on calcareous ground at 200–400 m. alt. Experiences in sowing and planting show that *Burretiodendron* seed has a high germinative capacity (> 80%) but is unsuitable for storage since it loses its viability after ca. 2 months. Nursery seedlings show good survival and reach a height of 30 cm. after 1 year. The species are suitable for introduction into subtropical forest having a mean annual relative humidity of ca. 80%, on soils with an organic content of < 6%.

2904. SHIH, C.-L. **[Growth, utilization and planting of *Schima*.]** *For Sci., Peking* 1956 (3), (249–56). 4 refs. [Chin.]

Mu-Ho (*Schima confertiflora*) is endemic only to S. China. It is one of the chief commercial timbers south of the Yangtze River, is of rapid growth (to 25 m. high and 100 cm. d.b.h.), can grow on poor and dry sites and up to 2000 m. alt., and has high resistance to disease, insect attack, and drought. It is generally found in mixture with *Pinus massoniana* or with *Quercus glauca*, *Castanopsis sclerophylla*, *Cinnamomum camphora*, *Camellia oleosa* and *Castanopsis* spp. The uses of its wood (sp. gr. 0·59–0·60) and the techniques of seed collection and storage, raising it in nurseries, and planting out (1 + 0 seedlings, ca. 40 cm. high, late autumn or early spring, best by *taungya*) are described in detail.

181.1. Distribution, Natural Range

See also No. 2953.

2905. SOUSA, E. P., and MENDONÇA, F. A. Observações acerca da distribuição e área das especies consideradas mais significativas de la flora de la Guinea Portuguesa. **[The distribution and area of the most significant species of Portuguese Guinea.]** *C.R. 6ième. Sess. Conf. int. Afr. Ouest* Vol. 3, 1956 (139–53). [Port.span.f.e.]

Enumerates the factors determining distribution, the main communities and their representative species, and shows in a table the African distribution of nearly 250 species present in Portuguese Guinea.

2906. FLORESCU, I. A. Contribuţii la stabilirea originii castanalui din nord-vestul Oltenei. **[The origin of *Castanea sativa* in N.W. Oltenia.]** *Rev. Pădurilor* 1958 (10), (620–2). 19 refs. [Rum.russ. g.f.e.]

Maintains that *C. sativa* is an indigenous species, dating from the Tertiary era.

2907. TSCHERMAK, L. Das Fehlen der Buche (*Fagus silvatica* L.) in den Innenalpen. **[The**

absence of Beech from the 'Inner Alps'.] *Cbl. ges. Forstw.* 75 (3/5), 1958 (208–23). 27 refs. [G.g.]

Presents palaeobotanical and documentary evidence for the Tyrol, Salzburg, Styria and Carinthia, indicating that Beech has not been found, or found only sporadically, during the present climatic period, in the 'Inner Alps' (a climatic and plant sociological concept, characterized by the absence of Beech, and the prevalence of 'continental-type' species such as *Pinus cembra*, Larch, or Scots Pine, and not identical with the 'Central Alps') [cf. *F.A.* 12 No. 219].

2908. IZDEBSKI, K. Wyniki wstępnych badań nad ekologią i rozmieszczeniem dębu szypułkowego (*Quercus robur* L.) w Polsce. **[Results of preliminary studies on the ecology and distribution of *Q. robur* in Poland.**] *Sylwan* 101 (12), 1957 (46–54). 13 refs. [Pol.]

Lists 22 natural or near-natural Oak stands in Poland examined in the study, and gives brief general notes on edaphic, physiographical, climatic and biotic factors.

181.2. Atmospheric Relations. Acclimatization

See also Nos. 2756–7, 2767, 2804, 2808–9, 2815–6, 2921, 2946, 2984, 3012, 3278.

2909. RICHTAR, B. Vliv světla na klíčivost, růst a vývoj semenáčků. **[The influence of light on germination, growth and development of seedlings.**] *Sborn. čsl. Akad. zeměd.* (*Lesn.*) 4 (10), 1958 (933–6). 3 refs. [Cz.russ.g.]

When germinating seeds of 8 species were subjected to (*a*) constant light, (*b*) normal day-length (partly in December, partly in March) and (*c*) total darkness, at 17–23° C., most species reacted favourably to (*a*) and unfavourably to (*c*), differences in germination % and germinative energy (% after 7 days) being very much more marked between (*b*) and (*c*) than between (*a*) and (*b*). Germination % of *Larix decidua* and *L. sibirica* was, however, not affected, and that of Spruce (*Picea abies* and *P. sibirica*) only very little. *Pinus sylvestris* was the most photo-sensitive species followed by *P. mugo*, *Alnus glutinosa*, and *Betula alba*.

2910. PHILLIPS, I. D. J., and WAREING, P. F. **Effect of photoperiodic conditions on the level of growth inhibitors in *Acer pseudoplatanus*.** *Naturwissenschaften* 45 (13), 1958 (317). 2 refs. [E.] O.R.S.

Seedlings exposed to short-day conditions (8 hr. natural daylight and 16 hr. darkness) produced more growth inhibitors in shoot apices and mature leaves than those exposed to long-day conditions (8 hr. daylight, 8 hr. illumination at 500 luxes and 8 hr. darkness). Similar experiments with *Betula pubescens* and *Robinia pseudoacacia* have so far failed to show any such significant differences.

2911. VAUPEL, A. Mikroklima und Pflanzentemperaturen auf trocken-heissen Standorten. **[Microclimate and plant temperatures on dry, warm sites.**] *Flora, Jena* 145 (3/4), 1958 (497–541 + 2 gphs.). 42 refs. [G.g.] O.B.D.

In two localities, (1) Germany—Krainberg bei Gambach (Main), and (2) Sicily—Monte Pellegrino near Palermo, 24-hour measurements of temperature were made on 7 species, among which were 2 tree species, *Eucalyptus globulus* and *Pinus pinea*. Other factors such as insolation, wind etc., were also measured and observed. Microclimatic conditions on hot dry sites are described, with particular reference to the significance of an extremely warm air layer near the soil. The surface and internal plant temperatures found did not exceed the already known maximum values (45–55° C.). It seems that the temperatures of plants on Mediterranean sites do not differ materially from those of plants on central European sites.

2912. ASHTON, D. H. **The ecology of *Eucalyptus regnans* F. Muell.: the species and its frost resistance.** *Aust. J. Bot.* 6 (2), 1958 (154–76 + 2 plates). 20 refs. O.B.D.

Presents information on distribution, growth habit, cytology, variations and hybridization, and general history. *E. regnans* almost certainly forms hybrids with *E. obliqua*. Field observations and refrigerator experiments show that the seedlings of *E. regnans* are relatively frost-sensitive, a sensitivity increased by manuring with organic N. Under artificial frost, softened seedlings are killed at temperatures < 25–27° F.; well-hardened ones at temperatures < 20–22°. In the field the lethal frost temperature is some degrees lower. Ecoclines exist in the *E. regnans* populations in South-central Victoria. The seedlings show a gradation in both frost resistance and growth rate along altitudinal gradients. Seedlings derived from trees growing at the edge of a frost pocket at Wallaby Creek (2000 ft.) combine a relatively high frost resistance (equal to that of seedlings at 3700 ft.) with a high growth rate. *From author's summary.*

181.3. Water, Soil and Root Relations

See also Nos. 2756–9, 3529–30.

2913. RÖHRIG, E. Untersuchungen über das Jugendwachstum von Schwarzpappelhybriden auf verschiedenen Standorten. **[Early growth of Black Poplar hybrids on different sites.**] *Silvae Genet.* 8 (1), 1959 (24–30). 17 refs. [G.g.e.f.]

Six Black Poplar hybrids of importance in Germany were grown on 31 different experimental plots. Data are presented on site conditions, weather and height growth over the years 1951–55. Existing knowledge of the site requirements of Black Poplar hybrids was confirmed, but not claims made about the special site requirements of cultivars [cf. *F.A.* 18 No. 1368], at least in youth. In these experimental plots, with very varying site conditions, in all cases *P.* × *robusta* and *P.* × *vernirubens* were ahead of the rest in in development. *P.* × *regenerata* and *P.* × 'Leipzig' showed average values for the production of all plots, 87 and 85·5% respectively of that for *P.* × *robusta*, while *P.* × *serotina* and *P.* × *marilandica* followed with 79·7 and 77·4%. The deviations of the 31 single values are rather large, but they are independent of site conditions. *From author's summary.*

2914. SETH, S. K. **Report from India on silviculture and management of Teak. I. Teak races and seed origins. II. Teak soils.** [*Docum.*] *2nd Sess. FAO Teak Sub-Comm., Bandung 1957* No. *FAO/TSC*-57/7, [1957]. pp. 21. 79 refs. Limited distribution.

A review of the literature, covering for (I) India only, for (II) also Burma, Indonesia, and Pakistan, and discussing structure, nutrients and water relations, geology, pH and soil deterioration and soil conservation in Teak plantations.

2915. SETH, S. K., and YADAV, J. S. P. **Teak soils.** *Indian For.* 85 (1), 1959 (2–16). 79 refs.

Reviews the literature on Teak forest soils, for both natural and artificial forests, with reference to India, Pakistan, Burma, and Indonesia, indicating the optimum conditions of soil, elevation, topography, moisture, nutrients etc. for Teak growth, and the relationship between geological formations and the composition and distribution of Teak forests, Teak's requirements as regards pH and lime, and soil deterioration under pure Teak plantations.

181.31. Water Relations

See also section 116 and Nos. 2765–6, 2795, 3685–6.

2916. KURAKINA, L. I. Vlijanie vlažnosti počvy na rost i razvitie sejancev *Larix sibirica* Ldb. **[The influence of soil moisture on the growth and development of *L. sibirica* seedlings.]** *Bot. Z.* 43 (11), 1958 (1627–30). 2 refs. [Russ.]

Tabulates data on height and root growth, weight etc. of seedlings grown in pots kept at 20, 40, 60 and 80% of total moisture capacity. Results showed conclusively that 60–80% was the optimum.

181.32/.34. Soil and Nutrient Relations

See also Nos. 2704, 3084–90, 3142, 3148, 3200, 4008.

2917. NICOLÁS ISASA, A., SERRANO NARBONA, P., and MORALES CHOFRÉ, E. Sección de ecología, tipos de montes y suelos forestales. **[Section for ecology, forest types and forest soils.]** *An. Inst. for. Invest. Exp., Madrid* No. 2, 1957 (19–24 + 2 plates). [Span.]

Presents data collected from a study of soils under Pine (particularly *Pinus nigra*), in the southern mountains of Guadalajara that border on the northern part of Cuenca, and under *Quercus suber* in Badajoz [cf. *F.A.* 19 No. 1534].

2918. **Pot culture trials with *Pinus radiata*.** *Rep. For. Dep. W. Aust. 1957/58*, 1958 (27).

A series of pot-culture trials with *P. radiata* growing on lateritic gravelly soils indicated that on such soils it is likely to experience a gross deficiency of N and P and a moderate deficiency of Mo. Possible deficiencies of K, Ca, S, and Cu were also indicated.

2919. HORVÁTH, I. **Annual periodicity in the weight and metabolism of Scotch Pine seedlings.** *Abstr.* in *Acta biol., Budapest, Suppl.* No. 2, 1958 (28–9). [E.] O.R.S.

Reports on experiments at the biological station at Alsógöd in 1955–57. Increase in weight and uptake of nutrients proved to have an annual periodicity in both mature trees and seedlings, and to differ in shoots and roots. The maximum increase in shoot weight, 80% of the annual increase, occurs in July–August, and that of roots in March–May (25%) and September (50%). Increase of N and P in the roots is not significant until August, while in shoots it is considerable also during the early summer. The dry weight of seedlings remains fairly constant during the dormant period, but various substances, especially N, migrate from the shoots to the roots. Root growth is considerable during the winter, and is related to soil temperature. The increase in weight and the nutrient absorption are similar in 1- and 2-year seedlings, although there is a difference in the rate at which they occur, and postponement of sowing for 2 months had no effect, in 1-year seedlings. Results suggest that for 1-year seedlings a single top dressing with N and P should be given in July, and that for 2-year seedlings this should be preceded by a top dressing with N in early spring.

2920. WHERRY, E. T. **Soil acidity preferences of selected woody plants.** *Morris Arboretum Bulletin, Philadelphia, Pa.* 8 (1), 1957 (19–20). L.S.

Lists genera of the Ericaceae and 25 native American species (including *Acer pennsylvanicum, Betula lenta, Castanea dentata, Chamaecyparis thyoides, Picea rubens, Pinus rigida, Quercus rubra* and *Tsuga canadensis*) needing acid soils, and a number of native and exotic genera that are relatively indifferent to soil reaction.

2921. **Tree growth, forest productivity and soil type.** *Rep. Nat. Conservancy, Lond. 1957/58*, 1958 (65–7).

The influence of site factors on tree growth has been studied by growing seedlings of *Quercus sessiliflora* in experimental cages to give controlled environmental conditions. The experimental cages were covered with layers of nylon netting to simulate different intensities of canopy cover; 3 layers of nylon reduced light intensity to ca. 15% of that in the open, while precipitation at ground level was halved. Over a 3-year period, increased shading resulted in a marked increase in the height of the Oak seedlings, but shaded seedlings weighed less than unshaded, chiefly because their root systems were relatively poorly developed. Records have been made of some of the variations that occur with age in the growing stock, ground flora, surface organic matter and mineral soil in (*a*) plantations of *Pinus sylvestris* and (*b*) natural stands of *Betula verrucosa*. After ca. 55 years of afforestation with Scots Pine, ca. 90% of the total organic matter produced and the nutrients absorbed by the trees and ground vegetation have been returned to the soil via the litter fall. Comparison of the productivity and nutrient uptake of (*a*) with those of (*b*) have shown that the greater initial productivity of (*b*) can be attributed to the closer stocking. Once the crowns in (*a*) close to give a continuous canopy, productivity of Pines becomes greater than that of Birch of similar age. The higher productivity of

the evergreen Pine forest seems to be related to its capacity to photosynthesise throughout the year whenever weather is suitable.

2922. OVINGTON, J. D. **Mineral contents of plantations of *Pinus sylvestris* L.** *Repr.* from *Ann. Bot., Lond.* 23 (89), 1959 (75–88). 9 refs.

The % composition and total contents of Na, K, Ca, Mg, P, and N in the leaves, branches, cones, boles and roots of sample trees from a series of 9 even-aged (7- to 55-year) plantations of Scots Pine were determined. From this, calculations were made of the total nutrient uptake of the trees (both annually and for the whole rotation), the removal of nutrients from the site in the crop, the immobilization of nutrients within the trees, and the return of nutrients to the soil through litter fall and unharvested material. At 55 years, the total nutrient content of the standing trees and of the stems of felled trees, represents only 32% of the Na, 13% K, 21% Ca, 25% Mg, 13% P, and 13% of the N taken up by the trees during their lifetime. Nevertheless, the increasing amounts of nutrients in the trees as they become older do represent a significant removal of the elements from the active nutrient cycle between the soil and trees.

2923. POHITON, P. P. Vlijanie drevesnoj rastitel'nosti na plodorodie dernovo-podzolistyh počv Poles'ja. **[The influence of woody species on the fertility of sod-podzolic soils of the Poles'e [Ukraine].]** *Lesn. Hoz.* 11 (4), 1958 (17–9). [Russ.]

The soil below an Oak/Pine/Birch stand showed higher N contents than that under pure Oak, which in turn was better than that under pure Pine. Denser planting (to get earlier canopy closure and more litter) and conversion of pure Pine to mixtures are recommended to improve the predominantly sandy soils of the region.

2924. ZAKOPAL, V. Vliv březových porostů na půdní stav holin v oblasti Křivoklatské. **[The effect of Birch on soil conditions in clear fellings in the Křivoklát region.]** *Sborn. čsl. Akad. zeměd. (Lesn.)* 4 (10), 1958 (877–96). 10 refs. [Cz.cz.russ.g.]

Describes investigations, made in connexion with other studies of the area [cf. *F.A.* 19 No. 2980], on soils of 4 old clear-felled areas now partly covered with Birch [*Betula verrucosa*] 12–30 years old and up to 22 m. high. The soil under the Birch showed a higher % of clay particles in the upper, and a smaller proportion in the lower layers, and its porosity and aeration were improved. Contents of humus, soluble N and other nutrients were higher, particularly in the upper layers, and increased with age. In a 30-year stand, contents of MgO, P_2O_5 and CaO were 80, 50 and 40% higher respectively, than on the clear fellings. In some places, raw humus accumulated under the very dense young stands, causing a rise in pH of 0·25–0·50 near the surface, but at 30 years, after vigorous self-thinning, humification was normal and pH back to that of the clear felling. Nitrate formation and general biological activity were much greater and, down to a depth of 40 cm., both relatively and absolutely high. Floristic analysis showed a progressive deterioration of the soil on the clear fellings, with occasional temporary waterlogging, while the various stages of Birch stands showed a gradual return to a forest flora and other indications of soil rehabilitation. *From author's summary.*

181.35. Special Modes of Nutrition. Symbiotic Relationships. Parasitism

See also No. 3287.

2925. MORRISON, T. M., and HARRIS, G. P. **Root nodules in *Discaria toumatou* Raoul Choix.** *Nature, Lond.* 182 (4651), 1958 (1746–7). 2 refs.

D. toumatou is a thorny shrub belonging to the Rhamnaceae, endemic in N. Zealand. The root systems of plants growing in a number of widely separated localities were examined, and all found to be nodulated.

2926. STEVENSON, G. **Nitrogen fixation by non-nodulated plants, and by nodulated *Coriaria arborea*.** *Nature, Lond.* 182 (4648), 1958 (1523–4). 1 ref.

The supposition that nodulated plants of *Coriaria* spp. fix atmospheric N [cf. *F.A.* 20 No. 250] is confirmed by experiments on wild seedlings of *C. arborea* with root nodules, using N^{15}; considerable fixation of N occurred. The present author has also investigated the possibility of N fixation by non-nodulated plants that make vigorous growth in poor soils. Evidence has been gathered from 3 lines of inquiry: (*a*) records of field experiments on crop yields in relation to fertilizer and soil N, including measurements in *Pinus radiata* plantations on sand dunes or depleted soils in New Zealand, which showed a gain over 25 years of 38 lb. N/acre/year; (*b*) pot experiments with a number of non-nodulated plants grown in a medium free from combined N, in the absence of non-symbiotic N-fixing micro-organisms, which showed substantial gains in N over period of 6 months to 3 years; (*c*) experiments with plants grown in a minus-N culture, in enclosed glass pots and with the whole plant or shoots and roots separately exposed to an atmosphere enriched with N^{15}, when significant gains in N^{15} were made by the growing plants (*Coprosma robusta*, *Prunus armeniaca*, *Pinus radiata*, *Dactylis glomerata*, *Epilobium erectum* and *Coriaria arborea*). In the case of *P. radiata* and *D. glomerata*, it appears likely that fixation is a function of the mycorrhizae, though it still has to be proved that bacteria in or on these fungal roots are not implicated. In the case of fixation in the leafy shoots, it is possible that bacterial glands are responsible for the effects, but it is also possible that some leaves may yet be found to have a capacity for fixing N gas in the absence of micro-organisms.

2927. HARRIS, G. P., and MORRISON, T. M. **Fixation of nitrogen-15 by excised nodules of *Coriaria arborea* Lindsay.** *Nature, Lond.* 182 (4652), 1958 (1812). 4 refs.

Excised nodules of *C. arborea* were put in containers evacuated to 0·5 atm., and the pressure was then restored by the introduction of N containing ca. 60 atom % N^{15}. Acid extracts of 3 samples of nodules were later found to contain 0·89, 0·71, and 0·51 atom % excess N^{15}, giving clear evidence of fixation of N^{15}.

2928. LEAF, G., GARDNER, I. C., and BOND, G. **Observations on the composition and metabolism of the nitrogen-fixing root nodules of *Alnus*.** *J. exp. Bot.* 9 (27), 1958 (320–31). 23 refs. O.B.D.

Nodules of *Alnus glutinosa* were exposed to excess N^{15} either before or after detachment from the plant. The soluble N compounds were extracted from the nodules and the extracts fractionated by chromatography on an ion-exchange resin. The amino-acid composition of the extracts was thus determined, and it was confirmed that citrulline is the predominant amino-acid present, being accompanied by smaller amounts of aspartic, glutamic, and γ-aminobutyric acids, arginine, and other constituents. The highest atom % excess N^{15} was always found in glutamic acid and the next highest in citrulline or aspartic acid. NH_3 contained a smaller proportion of N^{15} than these compounds, and arginine showed only very small enrichment. When the citrulline was degraded to NH_3 and ornithine it was found that the NH_3 liberated was richer in N^{15} than even glutamic acid. The significance of these findings in relation to the fixation and further metabolism of N by the Alder nodule is discussed. *Authors' summary.*

2929. MELIN, E., NILSSON, H., and HACSKAYLO, E. **Translocation of cations to seedlings of *Pinus virginiana* through mycorrhizal mycelium.** *Bot. Gaz.* 119 (4), 1958 (243–6). 12 refs. O.B.D.

Mycorrhizal seedlings were cultured aseptically with mycorrhizae produced by *Rhizopogon roseolus*. The fungus was exposed to Na^{22}, the movement of which into the seedlings was observed. Relatively large amounts of Na were absorbed from the external supply and transferred to the mycorrhizae through the fungus in 48 hours. From them the ions were readily translocated into the root and shoot tissues. *From authors' summary.*

2930. DOMINIK, T. Badania mykotrofizmu zespołów buka nad Bałtykiem. [**Research on mycotrophy of Beech associations bordering on the Baltic.**] *Ekologia Polska, Warszawa* 5*A* (7), 1957 (213–56 + 1 tbl.). 32 refs. [Pol.pol.f.*f.*] Price *Zl.*14. O.R.S.

A study of the mycorrhizae of plants of the association *Fagetum boreoatlanticum* at Rozewie, Lubin and Wapienica, near Szczecin and near Gdynia. *From author's summary.*

2931. MOSER, M. **Artificial mycorrhizal inoculation of forest plants.** Translation Service, Department of Internal Affairs, Wellington, New Zealand. 1958. pp. 9. Transl. from *Forstwiss. Cbl.* 77 (1/2), 1958 (32–40). [See *F.A.* 20 Nos. 1734–5.] Limited distribution.

2932. BOKOR, R. Vizsgálatok a tölgyek valódi mykorrhiza-gombáinak meghatározása ése zekkel való társulásuknak mesterséges létrehozása terén. [**The true mycorrhizae of Oak and inducement of artificial symbiosis.**] *Erdészettud. Közl., Sopron* 1958 (1), (93–118). 19 refs. [Hu.hu.russ.e.g.*russ.e.g.*]

Following an analysis of the fungal association of Hungarian Oak forests, 23 selected species were bred from basidiospores [cf. *F.A.* 17 No. 1336] and tested on sterile-grown Oak plants. Genuine symbiosis developed with 15 species, of which 6 (1 *Amanita*, 1 *Cortinarius*, 3 *Russula* and 1 *Scleroderma*) are reported for the first time on Oak. Further tests with various combinations, including tests of incompatibility, indicated that inocula need to contain species of the genera *Amanita*, *Boletus* and *Russula*. Finally, 4 combinations were tested in an agricultural soil. Evaluation of Oak plants after 2 years showed marked effects on growth. Mean dry weight without foliage was 3·6 times that of controls. The best combination consisted of *Boletus edulis*, *B. subtomentosus*, *B. scaber*, *Amanita vaginata*, *Russula cyanoxantha*, *R. alutacea*, *R. fragilis*, *Scleroderma vulgare* and *Hebeloma crustuliniforme*. The last named was added as it decomposes cellulose and helps to sustain the other fungi until the mycorrhizal association is completed. Ca. 20 g. of inoculum (produced on a peat-nutrient medium) was placed in holes between the plant rows to which ca. 2 g. tannin, either as powdered bark or mixed with sand, had been added to promote fungal and inhibit bacterial growth.

181.36. Root Relations and Root Development etc.

See also Nos. 3147, 3199.

2933. KALELA, E. K. Über Veränderungen in den Wurzelverhältnissen der Kiefernbestände im Laufe der Vegetationsperiode. [**Changes in the root systems of Pine stands during the growing season.**] *Acta for. fenn.* 65 (1), 1955 (1958). pp. 42. 5 refs. [G.fi.]

Reports an investigation based on the analysis of soil columns 10 cm. in diam. and 60 cm. deep, taken in stands of the *Vaccinium* type on homogeneous sandy soils in Central Finland. Total seasonal fluctuations (in m. of root length per sq. m. projection) followed the pattern described by Heikurainen [cf. *F.A.* 17 No. 2556] but showed a slightly later peak. Fluctuations were greater in the humus layer, which had the greater density per cu.m., and among the roots < 1 mm. thick. Fluctuations in the quantity of root-tips were similar but greater. No clear relationships between rainfall and root quantity emerged, but during an August dry period, root-tips on an irrigated sq. m. were 53,300 compared with 1000 on an adjoining dry control area. Within the age range 35–110 years, no significant difference of total root quantity was found, but there was a tendency for root quantity in the lower mineral-soil layer to increase, and of number of root-tips to decrease with advancing age. The effects of thinning and selective fellings have already been described [cf. *F.A.* 17 No. 2557].

2934. OGIEVSKIJ, V. V. Vlijanie uslovij mesto-proizrastanija na stroenie kornevyh sistem v 17-20-letnih kulturah sosny (*Pinus silvestris* L.) Leningradskoj oblasti. [**The effect of site factors on the form of the root system of 17- to 20-year *P. sylvestris* in plantations in Leningrad province.**] *Bot. Ž.* 43 (11), 1958 (1613–8). 15 refs. [Russ.]

Investigations in several Pine plantations showed that, in the main, the root systems were similar to

those of natural stands: on *Vaccinium* and *Pinetum oxalidosum* sites, the trees had well developed horizontal roots, tap-roots and sinkers, the sinkers often being longer than the tap-roots. On *P. myrtillosum* and *P.m. oxalidosum* sites with a groundwater level > 0·7 m. below the surface, the trees had normally developed horizontal and tap-roots, sinkers being either very small or absent altogether. On *P. sphagnosum*, *P. polytrichosum* and *P. myrtillosum* sites with a ground-water level 0·5–0·6 m. below the surface, the trees developed an entirely superficial root system.

2935. HORTON, K. W. **Rooting habits of Lodgepole Pine.** *Tech. Note For. Br. Can.* No. 67, 1958. pp. 26. 30 refs.

More than 40 root systems of varied ages and in diverse soils in Alberta were excavated [methods described and results photographed]. Lodgepole Pine root-forms vary widely with different soil conditions and between individuals in the same soil; the adaptability of this species' rooting habit explains its wide ecological amplitude. Vertical rooting is restricted by very coarse-textured soil, by a high water-table, and by an impermeable layer, and in such conditions the roots become bent, convoluted, clubbed, or dead. Penetration was greatest in fine sands deeply underlain by clays. Most of the lateral roots are in the top few inches of soil. They will seek out areas free from root competition, but on a fully stocked site the root systems of adjoining trees become interwoven and natural grafts may occur. For the first 20–25 years maximum lateral root growth was found to be about the same as stem height in the open-grown conditions sampled. In general, root growth is extensive at first, attaining maximum area coverage by 30 years, well before maximum stem height growth is attained; it then becomes much more intensive and complex. Rooting is more concentrated in the finer-textured soils, where both moisture and fertility are superior; thus a given depth of silt or clay has a greater effective root capacity than a similar depth of sand. Coarse sands and gravels inhibit rooting altogether. *From author's summary.*

2936. BERNDT, H. W., and GIBBONS, R. D. **Root distribution of some native trees and understory plants growing on three sites within Ponderosa Pine watersheds in Colorado.** *Sta. Pap. Rocky Mt. For. Range Exp. Sta.* No. 37, 1958. pp. 14 + 1 map, 1 photo.

Depth and lateral spread of root systems of 8 plant species, including 60- to 110-year-old Lodgepole and Ponderosa Pine, Douglas Fir and Aspen, were studied on the Manitou Experimental Forest on a sandy loam, a stony loam and a skeletal sandstone soil. The Pine and Douglas Fir roots reached maximum depths of 4–5·6 ft., except where limited by bedrock; Aspen showed the greater lateral spread, max. 48 ft., more than twice that of the other species.

2937. HSÜ, L.-K., *et al.* **[Research on the root system of woody species.]** *For. Sci., Peking* 1956 (2), (147–66). [Chin.]

A detailed, illustrated study of 19 species, including *Pinus bungeana*, *Populus davidiana*, *Pinus tabulaeformis*, *Quercus liaotungensis*, *Betula japonica*, *Prunus ansu*, *Salix cheilophila*, *Ostryopsis davidiana* and *Ulmus macrocarpa*. [Cf. *F.A.* 20 No. 2877.]

2938. CH'ÊN, P.-H. **[Investigations of root systems in young two-storeyed mixed hardwood forest in the N.W. region of the Little Hingan Mts.]** *For. Sci., Peking* 1958 (2), (157–62). 6 refs. [Chin. russ.]

Describes with illustrations, the root systems of *Quercus mongolica*, *Populus davidiana*, *Corylus heterophylla*, *Lespedeza bicolor* and *Betula platyphylla*. The first 4 species are commonest on brown forest soils; *B. platyphylla* is also found on moister sites.

181.4. Reaction to Biotic Influences (Competition etc.) and Fire

See Nos. 2956, 3014, 3147.

181.5. Reproductive Behaviour

See also Nos. 2756, 2787–9, 2812, 2819, 2844, 2909, 2947, 3009 *et seq.*, 3051 *et seq.*

2939. HOU, H.-T. **[Preliminary investigation on the flowering period of plants on Mount Miao Fêng, Peking.]** *For. Sci., Peking* 1956 (1), (55–9). [Chin.]

Data are tabulated, with scientific names and arabic numbers, for 97 species observed over two years, 1953 and 1954.

2940. KAŇÁK, K. Z květní biologie a plodivosti některých druhů *Pinus*, zvláště klimatypů *Pinus sylvestris* L. **[On the biology of flowering and fruiting of some *Pinus* species, and particularly of some climatic types of *P. sylvestris*.]** *Sborn. čsl. Akad. zeměd. (Lesn.)* 4 (12), 1958 (1097–108 + 2 plates). 12 refs. [Cz.russ.g.]

Reports observations made at Mláka, Czechoslovakia, on the flowering of *P. sylvestris* from Norway, Sweden, Finland, Scotland, the Baltic area, the Ukraine, the Carpathians, Germany, the Pyrenees, Belgium and Holland.

2941. BINGHAM, R. T., and SQUILLACE, A. E. **Phenology and other features of the flowering of Pines, with special reference to *Pinus monticola* Dougl.** *Res. Pap. Intermt. For. Range Exp. Sta.* No. 53, 1957. pp. 26 + 1 photo. 53 refs.

Reviews the literature and presents data on the dates of beginning and ending of flowering, both staminate and ovulate, of 45 young *P. monticola* trees for the period 1950–55 at altitudes between 2700 and 5000 ft. and at latitudes of 46° 49′–47° 10′.

2942. WU, H. **[A preliminary phenological study for four species of *Eucalyptus* in Canton.]** *For. Sci., Peking* 1958 (2), (163–70 + 16 photos). 5 refs. [Chin.e.]

Discusses and describes, with illustrations, the ecology and phenology of *E. citriodora*, *E. robusta*, *E. exserta*, and *E. umbellata* with special reference to methods and phases selected for observation, including a reproduction of the actual record cards. The observations, covering > 3 years, suggest that

all 4 species flower and fruit once a year, the fruit taking 2 years to ripen.

2943. **Karri [*Eucalyptus diversicolor*] silviculture: bud development, flowering, and seedbed.** *Rep. For. Dep. W. Aust. 1957/58*, 1958 (25).

Two years' observations on crown development of Karri indicate the following trends: (*a*) the period between bud inception and flowering is ca. 2 years, beginning at 1½, but usually extending over 2½ years; (*b*) the period between flowering and commencement of seed shedding is up to 2 years, and normally 1–1½ years; (*c*) the normal cycle from bud inception following the first seeding, to the next seeding is 4 years; (*d*) for well stocked stands the first light seeding begins at age 25 years; at 80 years, well stocked regrowth stands may shed > 25% of the amount of seed shed by virgin stands; (*e*) ripe seed is available for regeneration over a period of 18 months —from spring of the seeding period to the second autumn; 75% of this supply is available over the first 12 months; (*f*) most of the seed available at any time may be brought down within the first 2 months after burning.

2944. HAFTORN, S. Synzoisk frøspredning hos norske fugler. **[Synzoic seed dispersal by Norwegian birds.]** *Blyttia, Oslo* 14, 1956 (103–21). 15 refs. [Nor.e.] L.S.

Tits were found to carry seeds of Pine, Spruce, Juniper and *Galeopsis* spp. in some quantities for distances up to 30 m., seeds being stored individually, usually in trees. It is concluded that tits contribute substantially to the distribution of Juniper and *Galeopsis*, which are not wind-distributed. Species of Corvidae carrying and storing acorns and hazelnuts are also briefly discussed.

2945. SELÇUK, H. Ibre örtüsü ve mul toprağinin çimlenme üzerindeki tesirleri. **[Effect of Spruce needle litter and of mull soil on germination.]** *Orm. Araşt. Enst. Derg.* 3 (1), 1957 (14–8). [Turk.g.]

Laboratory tests with filled Petri dishes and *Pinus sylvestris*, *Picea excelsa*, *Alnus glutinosa* and *Abies nordmanniana* showed no significant difference in germination % on the two media (litter 4·6, mull 8·0 pH); the Spruce litter somewhat accelerated the rate of germination.

181.6. Life Form, Habit. Post-Seedling Development and Form

See also Nos. 2921, 2960, 3515–6, 3536, 3678.

2946. JOVANOVIĆ, M. Neka zapažanja o uticaju svetlosti na proizvodnju drvne mase kod hrasta. **[The influence of light on the wood production of Oak.]** *Šumarstvo* 11 (3/4), 1958 (144–54). 13 refs. [Serb.serb.e.f.]

Discusses findings from measurements of leaf area and diam. increment of 15 trees of *Q. robur* in stands between 35 and 140 years old from 8 different sites in Serbia. Data are tabulated for d.b.h., height, volume, number of leaves and leaf area, and site conditions of each tree. It is concluded that the area of assimilating tissue necessary to produce a unit of wood volume is greater in inadequate than in more favourable light conditions and develops in inverse ratio to the amount of direct and diffuse sunlight available. The leaf area necessary to produce 1 cu.m. and 1 kg. of wood (including bark) is shown for each sample tree. [Cf. *F.A.* 10 No. 1479; 16 No. 1528.]

181.8. Phenology

See also Nos. 2756, 2770, 2776–81, 2815–6, 2820, 2919, 2933, 2939–43, 3043, 3397, 3428, 3456, 3514, 3585, 3663, 3678.

2947. KAYACIK, H. Belgrad ormanında fenolojik müşahedler (1943–1957). **[Phenological observations in the Belgrade forest [near Istanbul].]** *Istanbul Üniv. Orm. Fak. Derg.* 7*A* (2), 1957 (21–35). 9 refs. [Turk.g.]

Observations on 10 common European trees and *Quercus conferta*, *Fagus orientalis*, *Tilia argentea*, *Platanus orientalis*, and *Celtis australis* cover bud and flower break, leaf unfolding, fruit setting and ripening, beginning and end of leaf coloration, and the number of days from flower break to fruit ripening with accumulated air temperature. Meteorological statistics for this Istanbul instruction forest are tabulated.

2948. HOFMAN, J. Několik výsledků fenologickych pozorování a problematika lesnické fenologie. **[Some results of phenological observations and problems of forest phenology.]** *Práce výzkum. Úst. lesn. ČSR* No. 12, 1957 (67–109). Many refs. [Cz.russ.g.]

Presents data from material collected mainly in 1943–45 in the Křivoklát region (240–500 m. alt.) on the flushing of 16 tree species, including *Quercus robur*, *Fagus sylvatica*, *Carpinus betulus* and *Tilia cordata*. Differences in flushing dates between forms of the same species and between sites are discussed.

2949. MARCET, E. Die Phänologie als Bestimmungsmerkmal bei Pappelsorten. **[Phenology as a distinguishing character of Poplar varieties.]** *Berichte der Schweizerischen Botanischen Gesellschaft, Zürich* 66, 1956 (5–18). 8 refs. [G.g.] L.S.

Cuttings taken from 4 varieties at 30-day intervals from late Nov. to late March were placed in water at a room temperature of ca. 19° C. and given 12 hours' illumination daily. The order of flushing was at all times the same as in the open, namely *Populus tacamahaca*, *P.* × *robusta*, *P.* × *regenerata* and *P.* × *serotina*. A single test with 5 additional clones gave the same order. The time taken to break dormancy decreased towards spring, at a different rate for each variety. Tests in late autumn should therefore show late- or early-flushing tendencies most clearly.

182. Synecology, Plant Sociology: General, Principles and Methods

182.1. Palaeoecology. History of Vegetation. Pollen Analysis

See also Nos. 2845, 2856, 2963, 2972.

2950. HARING, A., VRIES, A. E. DE, and VRIES, H. DE. **Radiocarbon dating up to 70,000 years by**

isotopic enrichment. *Science* 128 (3322), 1958 (472–3). 3 refs. O.R.S.

The three samples so far treated include a sample of wood, dated at 64,000 ± 1100 years. The most important source of error is infiltration of recent organic material.

2951. JACOB, H. Waldgeschichtliche Untersuchungen im Tharandter Gebiet. **[Investigations on forest history in the Tharandt region.]** *Beiheft, Feddes Repertorium Specierum Novarum Regni Vegetabilis, Berlin* No. 137, 1957 (183–275 + 5 plates). 6 pp. of refs. [G.g.] E.B.

An account of analytical pollen profile investigations, and research on historical sources (maps etc.) to show the changes in forest vegetation in the Erzgebirge foothills from the pre-Boreal period to the present day.

2952. POP, E. Analiz pyl'cy v ravninnyh rajonah. **[Pollen analysis in plains.]** *Rev. Biol., Bucarest* 2 (2), 1957 (159–85 + 2 tbls., 5 dgms.). 47 refs. [Russ.russ.] O.R.S.

Describes the present flora, and the history of the vegetation (woody and non-woody species) of peat bogs, (*a*) near Craiova (S. Rumania) and (*b*) near Carei (N.W. Rumania), on the basis of pollen analyses.

2953. NÈGRE, R. Réflexions sur la répartition du pistachier de l'Atlas et du jujubier dans l'étage méditerranéen aride au Maroc. **[The distribution of *Pistacia atlantica* and *Zizyphus* sp. in the Mediterranean arid zone of Morocco.]** *Bulletin de la Société des Sciences naturelles et physiques du Maroc, Rabat* 38 (1), 1958 (9–16). 5 refs. [F.f.]

The fact that the Pistachio and the Jujube are mostly found on the better sites, being in retreat in the other parts of the dry zone while advancing in the semi-arid and even sub-humid zones, suggests that they are relicts of a vegetation of a semi-arid type and that the climate of these regions was once much less dry. *From author's summary.*

2954. WARDLE, P., and MARK, A. F. **Vegetation and climate in the Dunedin district.** *Transactions of the Royal Society of New Zealand, Wellington* 84 (1), 1956 (33–43). 13 refs. O.R.S.

Presents some results of a survey of vegetation and climate on the hills near Dunedin, which provide evidence of vegetation changes shortly preceding those for which European settlement has been responsible, and reveal some difficulties in correlating rainfall, evaporation and temperature records at selected sites with the type of vegetation they carry today. A map is presented which shows the distribution of indigenous coniferous forest, Silver Beech (*Nothofagus menziesii*) and snow-tussock (*Danthonia flavescens*) and also the areas in which log remains of *Podocarpus hallii* and *Dacrydium biforme* and surface dimpling indicate that snow-tussock has recently replaced forest. Silver Beech forests show vigorous regeneration and tend to encroach on snow-tussock and coniferous forest; the regeneration of the latter is poor. *From authors' summary.*

182.2. Succession, Alternation and Periodicity in Vegetation

See also Nos. 2954, 2958, 2962, 2967, 2978, 2986, 2988–90, 3015, 3184, 3300.

2955. DANSEREAU, P. Le coincement, un processus écologique. **['Constriction', an ecological process.]** *Repr.* from *Acta Biotheoretica, Leiden* 11 (3/4), 1956 (157–78). 33 refs. [F.f.e.g.]

By '*coincement*' the author means a process resulting from the narrowing of an environmental gradient with consequent reduction in the satisfaction of the requirements of a species or of a whole biocoenosis. The opposite tendency he calls '*effusion*' ['expansion'] and examples of both, and of the alternation of the two, are given.

2956. WEAVER, H. **Ecological changes in the Ponderosa Pine forest in the Warm Springs Indian Reservation in Oregon.** *J. For.* 57 (1), 1959 (15–20). 7 refs.

Until the present century the *Pinus ponderosa* forest was open, with only scattered clumps of regeneration. Since the early 1900's, overgrazing and fire have been excluded and understorey stands of Pine and other species have arisen, so dense that their growth is very poor. The growth and vigour of adult trees also are adversely affected, and serious barkbeetle epidemics have occurred. On one part of the area, swept by a hot surface fire in 1938, these drawbacks are not in evidence, confirming that fire is still a factor of great ecological importance. *From author's summary.*

2957. ENA, V. G. O bezlesii Jajlinskih massivov glavnoj Krymskoj grjady. **[The absence of forest on the Yaila massifs of the main Crimean mountain range.]** *Priroda, Moskva* 47 (12), 1958 (103–5). 1 ref. [Russ.] A.P.B.

The present timberline, formed by *Fagus taurica* and *Pinus sylvestris* var. *hamata*, is considered to have resulted from extensive grazing in earlier times. Now that grazing is restricted, Beech shows no sign of advancing upwards, but Pine regeneration appears to be doing so on northern slopes, succeeding against competition from *Juniperus* spp.

182.4. Layer Communities

2958. CRANDALL, D. L. **Ground vegetation patterns of the Spruce-Fir area of the Great Smoky Mountains National Park.** *Ecol. Monogr.* 28 (4), 1958 (337–60). 38 refs.

[Cf. *F.A.* 17 No. 2624.] Proposes and describes in detail 14 forest site types (not hitherto done for this region) and discusses successional and other relations of the lower and upper strata of these forests.

182.5. Synecological Measurements and Methods

See also No. 3604.

2959. KHAN, M. A. W. **Sampling unit in phytosociological studies.** *Indian For.* 84 (11), 1958 (651–63). 18 refs.

After a discussion of the principal current methods of sampling in vegetation studies, describes a method developed for use in Indian forests, which

combines the merits of transect and quadrat sampling. Quadrats 30 ft. square are laid out continuously, on the line of their diagonals instead of on the line of their sides. A transect of this kind, having 20–30 quadrats, gives the most satisfactory results. The advantages of the method are: (1) ease in lay-out and appreciable reduction in labour, cost, and time; (2) the merits of an ordinary belt transect but with elimination of error due to overlap; (3) reduction of edge-effect error as compared with circular plots; (4) proportionately greater length covered by the same number of quadrats (net gain ca. 40%).

187. Vegetation Types

See also Nos. 2689–90, 2694, 2711, 2843, 2899, 2954, 2958, 3006–8, 3184.

2960. STEVEN, H. M., and CARLISLE, A. **The native Pinewoods of Scotland**. Oliver & Boyd, Edinburgh. 1959. pp. xv + 368 + 20 plates. 18 pp. of refs. Price 63*s*.

A discussion of the native and naturally regenerated Pine woods of the Caledonian Forest and its associated communities, their history and ecology, with a detailed description, supported by sketchmaps, of 35 forests or woodlands, and a study by the second author of the morphology, including growth habit, of Scots Pine in Scotland. No useful correlations between characters independent of the environment and the 4 main habit types were found, and no distinct morphological variations as between low and high rainfall areas, but needle persistence appeared to be higher in the eastern than in the western groups. Systematic position and practical application for selection and breeding are discussed. An appendix presents lists of field layer communities and plants of the region.

2961. SKULT, H. Skogsbotaniska studier i Skärgårdshavet med speciell hänsyn till förhållandena i Korpo utskär. **[Forest botanical studies on Skärgårdshavet [the southwestern archipelago off Finland] with particular reference to the outer archipelago of Korpo.]** *Acta Botanica Fennica, Helsinki* No. 57, 1956. pp. 236 + 16 photos. 12 pp. of refs. [Sw.sw.e.] L.S.

Describes, with maps, the archipelago, its geology, soil, climate etc., and discusses the maritime tree limit, indicated in this region chiefly by *Sorbus aucuparia*, *Betula pubescens* and *Alnus glutinosa*, occasionally by *Populus tremula*, and more rarely by Pine or Spruce. The main tree species (e.g. Pine, Spruce, Birch, Alder, Ash, Poplar, Lime, Oak) are discussed in some detail, with data on their distribution in the archipelago, site requirements, increment, seed production, seed viability etc. Other sections deal with the types of woodland, chiefly Pine and Birch, their ground vegetation, distribution and regeneration, the effect of grazing, lopping for fodder and felling on species composition, and the degree of success of small-scale Pine plantations made during the last 40 years.

2962. SARASTO, J. Metsän kasvattamiseksi ojitettujen soiden aluskasvillisuuden rakenteesta ja kehityksestä Suomen eteläpuoliskossa. **[Structure and development of ground vegetation on bogs drained for afforestation in the S. half of Finland.]** *Acta for. fenn.* 65 (7), 1957 (1958). pp. 108. 52 refs. [Fi.g.*g*.]

Includes a description of survey methods and detailed plant lists, grouped by predominating type of moss. Many communities have a general heath character, with heather, mosses, herbs, or dwarf shrubs predominant, but containing many typical bog species (*Carex*, *Sphagnum*). Some mosaics of dry- and wet-site communities appear to be transitional, others climax. [Cf. *F.A.* 16 No. 458.]

2963. LUTZ, J. L., *et al.* Zur Charakterisierung von Biozoenose und Biotop des Übergangs-Moorwaldes. **[Characterization of the biocoenosis and biotope of the transitional forest occurring on raised bogs.]** *Forstwiss. Cbl.* 76 (9/10), 1957 (257–77). Many refs. [G.g.]

Data on site and vegetation of stands on the S. Chiemsee raised bog, with a collection of reports on: Soil profiles, including microbotanical [soil fungi, ground vegetation] findings (*H. Schmeidl*); Properties [physical and chemical] and composition of some selected profiles (*H. Schwaibold*); Microbiological investigations on selected profiles (*H. Poschenrieder* and *T. Beck*); The fauna of the forest soil of selected profiles (*G. Ronde*).

2964. RÜHL, A. Flora und Waldvegetation der deutschen Naturräume. **[The flora and forest vegetation of the natural regions of Germany.]** *Erdkundliches Wissen, Wiesbaden* No. 5/6, 1958. pp. 155 + 8 photos, 1 map. 264 refs. [G.]

Covers the area of Germany in 1937 plus the 'Polish Corridor', subdividediinto (I) Bavarian Alps and pre-alpine region, (II) Central German mountain regions, and (III) the N. German diluvial region, and further subdivided into 'major natural regions', e.g. the Schwarzwald, and 'natural regions', e.g. the Hochschwarzwald, discussing climate, geology, natural forest associations etc.

2965. SCAMONI, A. Vegetationsstudien im Waldschutzgebiet 'Fauler Ort' und in den angrenzenden Waldungen. **[Vegetation studies in the 'Faule Ort' forest nature reserve and the adjacent woodlands.]** *Beiheft, Feddes Repertorium Specierum Novarum Regni Vegetabilis, Berlin* No. 137, 1957 (55–109 + 1 map + 6 plates). 41 refs. [G.] E.B.

Gives full details of the geology, topography, climate and vegetation of the reserve (mainly mixed Beech forests of various types, *Acereto-Fraxinetum balticum*, *Fraxinetum fontinale*, and several other smaller associations), which is near Prenzlau, E. Germany. Conclusions are drawn on the ecology of the reserve, on forest management for similar areas, and on the value of nature protection.

2966. MOOR, M. Pflanzengesellschaften schweizerischer Flussauen. **[Plant communities on Swiss river flood-plains.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 34 (4), 1958 (221–360 + 6 photos, 27 tbls.). 122 refs. [G.f.it.e.]

Covers valleys in the Jura, the northern Alps and the plateau, and the middle valley of the Rhone, describing 34 associations, including several newly

formed or newly named ones, on the basis of 435 plots. The order followed is from the river bed via the flood-plain to the terrace in one direction, and down river in the other. Habitats and successions are discussed.

2967. BAUER, F. Vegetationsveränderungen im Dachsteingebiet zwischen 1800 und 1950. [**Vegetation changes in the Dachstein region [Austrian Alps] between 1800 and 1950**]. *Cbl. ges. Forstw.* 75 (3/5), 1958 (298–320). 7 refs. [G.g.]

The paper, which forms part of an extensive Karst research programme by the Institute of Spelaeology, Vienna, centering on this limestone region (ca. 1500–2000 m. alt., surmounted by a glacier massif) is based chiefly on a comparison of old photographs, mostly taken 60–80 years ago, with recent photographs. It is concluded that the decline of vegetation illustrated in the old photographs (many dead or dying trees etc.) and its subsequent revival (including young trees of *Pinus cembra*, more vigorous stands of dwarf Pine above the forest limits etc.) as shown in later pictures are chiefly caused by climatic changes and follow the advance or recession of the glaciers. On the S. slopes, where the forest limit had dropped several 100 m. in the middle of the 19th century, it has risen again to its former altitude. Some erosion was, however, permanent and soil losses continued where Dwarf Pine had died. Biotic influences, mainly sheep grazing, appeared to be of secondary importance.

2968. ZOLLER, H. Die Höhenstufen, Wälder, Trockenrasen, Hochweiden und Moore der Vogesen. [**Altitudinal zones, forests, xeric grasslands, alpine pastures and bogs in the Vosges.**] *Berichte der Schweizerischen Botanischen Gesellschaft, Zürich* 66, 1956 (342–54). [G.] L.S.

Describes the vegetation of the following zones: colline zone to 500 m.—basophile xeric grassland and *Quercus cerris* stands on limestone, acidophile xeric grassland and *Q. sessiliflora* forests on siliceous soils; montane-subalpine zone—Beech/Silver Fir forests; and, in less detail, the dwarf-shrub and dry grasslands, the Beech forests and the *Sorbus/Acer pseudoplatanus* stands of the upper regions (there is no timberline).

2969. KOPECKÝ, K. Fytocenologická studie bukových lesů jevanské vyvýšeniny. [**A phytocoenological study of the Beech forests of the Jevan hills.**] *Sborn. čsl. Akad. zeměd. (Lesn.)* 4 (12), 1958 (1065–96 + 4 tbls.) 60 refs. [Cz.cz.russ.g.]

The forests, ca. 40 km. S.E. of Prague at ca. 450–500 m. alt., are studied in considerable detail, using the method of the Zurich-Montpellier school of ecologists.

2970. STĂNESCU, V. Tipurile de pădure pe gresii cenomaniene din masivele Postăvar şi Piatra Mare. [**The forest types on Cenomanian sandstone in the Postăvar and Piatra Mare mountains.**] *Rev. Pădurilor* 1958 (7), (382–6). 7 refs. [Rum.russ.g.f.e.]

The most important types are several types of *Fagetum* (particularly those with *Luzula albida* and with *Festuca silvatica*), and Spruce more or less mixed with *Abies alba*. The productivity of the different types and their effect on stem-form are discussed.

2971. ALEXANDROWICZ, B. W. Podstawy ekologicznej klasyfikacji typów lasu. [**The bases for an ecological classification of forest types.**] *Sylwan* 101 (12), 1957 (1–19). 12 refs. [Pol.russ.e.]

Elaborates the author's own concept of typology [cf. *F.A.* 17 No. 3751].

2972. USLU, S. Iç Anadolu steplerinin antropojen karakteri üzerine araştırmalar. [**The man-made character of the central Anatolian steppes.**] *Istanbul Üniv. Orm. Fak. Derg.* 8 (1), 1958 (138–78). 13 refs. [Turk.g.*g.*]

On the basis of investigations tracing forest remnants, including forest steppe (thinly stocked with *Pyrus elaeagnifolia* etc.), degraded scrub, groups of trees and single specimens, it is concluded that the xeric tree-line was much lower in the past, that 50–55% of the area bore forests, and that the reduction of the forest area to its present level of 7–8% is due mainly to human influence.

2973. OLOVJANNIKOVA, I. N. O vlijanii lesnyh nasaždenij na prilegajuščuju stepnuju rastitel'nost'. [**The effect of forest plantations on the adjacent steppe vegetation.**] *Bot. Ž.* 43 (11), 1958 (1529–40). 8 refs. [Russ.e.]

Investigations near Stalingrad have shown that at the edge of large plantations (Oak plus other hardwoods) the vegetation has changed from a xerophytic to a meadow-steppe type, with increases in height and density and in the number of grass species present. The change is due to an increase in soil moisture, which is very marked for ca. 20 m. from the forest edge, can still be observed for a distance of 55 m., and is derived mainly from snow drifts. The profile of the southern chernozem soil has altered correspondingly, acquiring some characters of the more northern varieties of chernozem.

2974. VASIL'EV, N. G. Pihta cel'nolistnaja v lesah Južnogo Primor'ja. [***Abies holophylla* in the forests of the Southern Maritime Territory [U.S.S.R.].**] *Lesn. Hoz.* 11 (4), 1958 (13–7). [Russ.]

Describes the silvicultural characters of the tree. Notes are included on the 4 main types of forest (dry, fresh, moist and wet) in which it occurs in the territory. Mature stands of the moist type, of site quality I–I*a*, have in some places a total stocking of 800–900 cu.m./ha. The most important associated species are listed.

2975. KAO, S.-W., and P'AN, C.-K. [**Classification of the forests in the western part of Shansi Province.**] *For. Sci., Peking* 1956 (2), (75–85 + 1 tbl., 1 map). [Chin.]

The authors distinguish 9 regions, mainly on a floristic basis, describing the climate, topography, soil and vegetation [giving many scientific names], and tabulating the main tree and shrub species, with a map. Brief recommendations for elementary management are given.

2976. KAO, S.-W. **[The forests of the western part of Shansi province.]** *For. Sci., Peking* 1956 (2), (109–14 + 1 map). 2 refs. [Chin.]

A brief description, with a map showing 7 main types.

2977. CH'Ü, C.-H. **[Discoveryof virgin forest on Hainan Island [Kwantung Province].]** *For. Sci., Peking* 1956 (3), (279–81). [Chin.]

The forest [extent not stated] consisted of *Vatica astrotricha* and some *Hopea hainanensis*, with individuals exceedings 33 m. in height. On an area of 400 sq. m., 142 trees of *V. astrotricha* were counted.

2978. OSHIMA, Y., *et al.* **Ecological and physiological studies on the vegetation of Mt. Shimagare. I. Preliminary survey of the vegetation of Mt. Shimagare.** *Bot. Mag., Tokyo* 71 (843), 1958 (289–301). 12 refs. [E. jap.] I.M.I.

Reports on site factors, quadrats and transects, weights of leaves, branches and stems, undergrowth frequencies, light (intensity) etc., in subalpine *Abies veitchii*/*A. mariesii* forest, where contour strips (10 × 300–800 m. at 100-m. intervals) consisting of dead Firs and regeneration are succeeded downslope by young growth and trees of increasing age in a natural [and not yet explained] replica of Wagner's *Blendersaumschlag*.

2979. YATOH, K.-I. **[Materials for the botanical study of the forest flora of the Kii peninsula. I. Development of the study of forest botany of the Kii peninsula. III. Analysis and classification of the forest communities. IV. Natural forest vegetation zones of the Kii peninsula.]** *Reprs.* from *Bulletin, Faculty* of *Agriculture, Mie University, Tsu* No. 15, 1957 (93–109) [Jap.]; No. 18, 1958 (105–67). 38 refs. [Jap.e.]; No. 16, 1958 (139–49 + 16 photos.). 32 refs. [Jap.e.]

2980. YATOH, K.-I. **[Materials for the botanical study on the forest flora of the Kii peninsula. III [II?]. Geology and climate of the Kii peninsula. IV [V?]. A list of the ligneous plants in the Kii peninsula.]** *Bulletin of the Mie University Forests, Tsu* No. 3, 1958 (5–184 + 16 photos). 93 refs. [Jap.]

2981. SATYANARAYAN, Y., and MUDALIYAR, M. S. **Ecological studies of the evergreen forests of Matheran [Plateau, Bombay]. I. Floristic composition.** *Indian For.* 85 (1), 1959 (17–21). 10 refs.

A statistically-based ecological survey of the forests, giving data on frequency, density, and dominance of the various tree species. It is shown that *Memecylon edule* is not the type species of these forests, which are dominated by *Eugenia jambolana* and *E. heyneana*.

2982. ROSAYRO, R. A. DE. **The climate and vegetation of the Knuckles region of Ceylon. (A reconnaissance study with special reference to aerial photographic interpretation.)** *Ceylon For.* (*n.s.*) 3 (3/4), 1958 (201–60 + 4 dgms., 2 maps, 1 air photo mosaic). 35 refs.

The expedition here reported, in which full use was made of aerial photographs for locating sample areas, clearly showed that, within the compass of 62 sq. miles, a distinctive geographical region can be recognized which shows a complete sequence of tropical vegetation types from the dry evergreen formation to the extreme wet evergreen montane formation; these have evolved in close correlation with extreme and abrupt climatic variations induced mainly by topography (e.g. the isolated location of the Knuckles massif and its separation from the main massif of the island). The main vegetation types (described in detail, with lists of tree species, photographs etc.) have been classified as: (1) lowland tropical wet semi-evergreen forests, (2) submontane ditto, (3) montane tropical wet evergreen forest. Other vegetation types are a pigmy ('heath') forest (unique in the tropics) at the low altitude of 5000–5200 ft. and montane grassland (patana).

2983. ABRAHAM, M. F. H. **The East African Camphor forests of Mount Kenya.** *E. Afr. agric. J.* 24 (2), 1958 (139–41). 5 refs.

The high-rainfall forest type (50–90 in. p.a.) confined on Mt. Kenya to the S. and E. slopes, is divided into 3 sub-types: (1) lower altitudinal; (2) the Camphor (*Ocotea usambarensis*) forests at 6000–8000 ft.; and (3) the Bamboo forests. Sample plots on 2 main survey lines showed that (2) can be further subdivided into (*a*) secondary growth forests with a climax of pure *Macaranga*, (*b*) river-valley forests characterized by unstable soil, frequent windthrow and a preponderance of light-demanding species, and (*c*) the ridge-top forests containing the main commercial species and all the Camphor forest. Girth-class enumeration on 13 acres in a typical area of (2) (*c*), tabulated by species, showed that Camphor is not maintaining itself by constant regeneration. Conditions for its regeneration, rarely encountered in the forest, are discussed, and recommendations are made for cultivation after felling to encourage the establishment of suckers in the initial stage.

2984. WEBB, L. J. **Cyclones as an ecological factor in tropical lowland rain-forest, North Queensland.** *Aust. J. Bot.* 6 (3), 1958 (220–8 + 2 plates). 20 refs. O.B.D.

Describes briefly the influence of cyclones on the structural and floristic composition of tropical lowland and foothill rain forest in N. Queensland. Local intensification of wind velocities, probably exceeding 100 m.p.h., that occur regularly in parts of the coastal corridor south of Cairns, produces 'cyclone scrubs', having a low uneven canopy with scattered emergents densely draped with vines. In more sheltered areas, with cyclonic winds averaging 60–80 m.p.h., upper canopy defoliation and occasional windthrows have resulted in a dense understorey of the shade-intolerant *Calamus australis* under a relatively even canopy averaging 90–110 ft. high. On exposed spurs of the rugged coastal ranges *Acacia aulacocarpa* is a common emergent of vine forests. Fire following 'dry' cyclone damage may further modify vine forests adjacent to fire lanes in sclerophyll or grassy forest, eliminating the *Calamus* and giving rise to numerous sclerophyllous species in addition to *A. aulacocarpa*. The catastrophic effect of cyclones on the rain forests overrides the usual ecological factors and in such areas, even without human interference, a stable

forest climax is not attained. *From author's summary.*

2985. DANSEREAU, P. **A preliminary note on the structure variations of temperate rain forest.** *Repr.* from *Proceedings of the 8th Pacific Science Congress, Manila* 4, 1957 (407–33 + 3 dgms.). 45 refs.

2986. PATERSON, D. N. **Some observations of the virgin Spruce-Balsam forest in the British Columbia interior, with thoughts on reforestation in Great Britain.** *Emp. For. Rev.* 37 (4), 1958 (399–407).

Notes on soil, climate, stand structure (in relation to topography) and successional trends, as influenced by fire, wind and insects, in forests of *Picea engelmannii*, *P. glauca* and *Abies lasiocarpa* in British Columbia. It is suggested that degraded soils of heavy texture in sheltered inland areas of Great Britain may be suitable sites for the introduction of the two Spruce species, possibly with a preliminary burn of old peat soils.

2987. ARLIDGE, J. W. C. **A preliminary classification and evaluation of Engelmann Spruce/Alpine Fir forest at Bolean Lake, B.C.** *Abstr. of thesis,* in *For. Chron.* 34 (3), 1958 (324–5).

Two forest associations are determined: (1) *Picea engelmannii/Abies lasiocarpa/Vaccinium membranaceum/Rubus pedatus*(VM), and (2) *P. engelmannii/A. lasiocarpa/Vaccinium ovalifolium/Dryopteris linnaeana* (VO). Indications are that VO represents a better site quality than VM.

2988. RANDALL, A. G., SMITH, M. L., and WELCH, J. A. **White Pine [*Pinus strobus*] in the management of Red Spruce [*Picea rubens*] types.** *Tech. Note Univ. Me. For. Dep.* No. 49, 1958. pp. 3.

Investigation by forestry students indicates that White Pine is a natural component of the climax forest of Maine (Spruce/Fir/northern hardwoods). It appears to come in on gaps caused e.g. by removal of Spruce by budworm attack.

2989. MARK, A. F. **The ecology of Southern Appalachian grass balds.** *Ecol. Monogr.* 28 (4), 1958 (293–336). 66 refs. [Cf. *F.A.* 20 No. 1618.]

2990. LAESSLE, A. M. **The origin and successional relationship of sandhill vegetation and Sand-Pine scrub [in Florida].** *Ecol. Monogr.* 28 (4), 1958 (361–87). 30 refs.

Concludes that there is no successional relation between 'Sand-Pine scrub' (*Pinus clausa* with dense evergreen shrubs and little or no herbaceous ground cover) and 'sandhill vegetation' (open park-like stands of deciduous hardwoods with abundant herbaceous ground cover), and that the basis of the different types is nutritional, probably the lack of some trace element(s) in the sands supporting scrub.

2. SILVICULTURE

See also Nos. 2877, 2882, 2898–9, 2975, 3220.

2991. DAWKINS, H. C. **The management of natural tropical high forest with special reference to Uganda.** *Inst. Pap. imp. For. Inst., Oxf.* No. 34, 1958. pp. vii + 155 + 1 tbl. 142 refs.

It is believed that this paper will be of particular value to all who are faced with the task of bringing the residual areas of tropical high forest under systematic management. It is divided into the following sections: (1) Policy; (2) Examination (physical survey, exploratory sampling, dynamic sampling, production survey); (3) Determination (system of management, regeneration, tending, research, the future of tropical high-forest management). Appendixes deal with definition of terms; construction of volume tables; arboricides; construction of curves relating girth increment with girth and age; summary of current practice in tropical high forest; the system of management for natural high forest in Uganda.

2992. LEIBUNDGUT, H. Probleme des Waldbaues—Sammelreferat. **[Problems of silviculture—a review.]** *Forstarchiv* 30 (1), 1959 (1–11). 264 refs. [G.]

Deals with the most important problems discussed in mainly European literature published since 1950, and more especially since 1956, under the headings: forest physiology and ecology, care and tending of the forest, silvicultural systems and methods of regeneration, nursery management and tending of plants, afforestation, timber-growing outside the forest, site amelioration and fertilizing, and textbooks and standard works on these topics.

2993. JUNACK, H. Möglichkeiten und Erfolgsaussichten der Kiefernwirtschaft im küstenfernen Diluvium Niedersachsens. **[Possibilities and prospects of growing Pine on the Lower Saxony diluvium far from the coast.]** *Forst- u. Holzw.* 14 (2; 4), 1959 (21–6; 78–80). 2 refs. [G.]

Discusses the performance of Pine in the Lüneburg area; its establishment by different methods on different sites; underplanting with Douglas Fir; and the relative merits of the clear-felling system and systems involving two-storey management.

2994. KOLDANOV, V. JA., and CHU, C.-F. **[Observations on forests of *Pinus koraiensis* on the Little Hingan Mts. [N.E. China].]** *For. Sci., Peking* 1958 (2), (121–8). [Chin.russ.]

Report of a joint expedition to the Amur basin by representatives of the Forest Research Institute of the U.S.S.R. Academy of Sciences and the Forest and Soil Research Institute of the Chinese Academy of Science, in Oct. 1957. Soviet advice centred on the encouraging of natural regeneration, and in particular on replacing the system of clear felling and planting in these Pine/broadleaved forests by one of regeneration fellings, a change that should also help to control soil erosion. Pines and particularly *Pinus koraiensis*, predominate, the latter often > 500 years old, with *Larix gmelinii*

occupying the lower, moister reaches of the valleys (ca. 13–15% of the forest); also found are *Quercus mongolica*, *Betula platyphylla* and *Populus davidiana*. [Cf. *F.A.* 20 No. 3012.]

2995. GILBERT, A. M., and JENSEN, V. S. **A management guide for northern hardwoods in New England**. *Sta. Pap. Ntheast. For. Exp. Sta.* No. 112, 1958. pp. 22. 10 refs.

Discusses the different aims of old- and second-growth forest and tabulates some characteristics of the main hardwood species in New England, with recommendations on the silvicultural systems, tending, desired stocking and stand structure etc. of both types of forest.

2996. CHABROL, R. Notes sur la sylviculture du chêne en Lorraine. [**Notes on the silviculture of Oak in Lorraine.**] *Rev. for. franç.* 10 (12), 1958 (783–95). [F.]

The forests in question, consisting mainly of *Quercus robur* and *Q. sessiliflora*, with some Beech and Hornbeam, originated in the conversion of old coppice with standards, and are usually treated by regeneration fellings with a single periodic block. Protection of young regeneration from late frost by encouraging a light understorey is necessary.

2997. VYSKOT, M. Pěstění dubu. [**The silviculture of Oak.**] Československá Akademie Zemědělských Věd, Prague. 1958. pp. 287. 16 pp. of refs. [Cz.]

Contains the following chapters: (1) Economic survey: area of forests, their production and comparison with needs (the world, Europe and Czechoslovakia); economic significance of Oak; future aims. (2) Systematic classification and biology (including notes on species economically important to Czechoslovakia. (3) Silviculture: a general and a special section, the latter dealing with the growing of Oak in relation to special forest types with particular reference to Czechoslovakia. (4) Injuries and protection. Chapter headings and cross-heads are listed in Russian, English, French and German.

2998. CHIANESE, L. La pioppicoltura in Siria. [**Poplar-growing in Syria.**] *Cellulosa e Carta* 9 (10), 1958 (16–22). [It.f.e.g.]

Describes the indigenous types of Poplar chiefly grown in Syria: (1) the Roumi (a ♂ clone of *Populus alba*), (2) the Hamoui (a ♀ clone of *P. nigra*), (3) the Afarsi (another Black Poplar), and (4) *P. euphratica*; (1) and (2) account for 95% of the area carrying Poplar. Results of recent experiments with clones introduced from Europe are given, with comparative data from other countries.

2999. TABATABAI, M. Pappelanbau in Iran. [**Poplar cultivation in Iran.**] *Silvae Genet.* 7 (6), 1958 (169–81). 45 refs. [G.g.e.f.]

A short history of Poplar cultivation in Iran, with some data on the geography and climate of the country. Describes the silvicultural characters of 6 important species and varieties, methods used in propagation and cultivation, the pests and diseases encountered in Iran, and timber uses. Notes are included on the anatomy and properties of the wood of *Populus nigra* var. *italica*, the most important species used in Iran's wood industry. [Cf. *F.A.* 17 No. 180.]

22. Silvicultural Systems. Constitution and Composition of Stands; Forms of Stand

221. High Forest Systems

See also Nos. 3171, 3197.

3000. Çam-köknar-kayın karışık meşcerelerinde şeritlerde traşlama, şeritlerde siper ve gurup seçme tensil kesimleri denemesi. [**Clear-strip, shelterwood-strip and group-selection felling trials in mixed Pine/Fir/Beech forests.**] *Orm. Araşt. Enst. Yıl. Bült.* No. 4, 1956 (7–18, 45–6, 58–64 + 1 tbl.). [Turk.e.*e.*]

Presents tabulated results showing the % of quadrats having at least one surviving seedling in 1955 after clear-strip, shelterwood-strip or group-selection fellings in 1954, for various site treatments (harrowing, clearing or burning of slash etc.).

3001. Çam + köknar + kayın karışık meşcerelerinde şeritlerde traşlama tensil kesimi denemeleri. [**Clear-strip felling trials in mixed Pine/Fir/Beech forests.**] *Orm. Araşt. Enst. Yıl. Bült.* No. 5, 1957 (1–6, 28). [Turk.e.*e.*]

Presents a table showing the number of seedlings per ha. in 1955 and 1956 on plots in strips clear-felled in mixed Scots Pine, *Abies bornmülleriana* and *Fagus orientalis* in 1952. Satisfactory regeneration of Pine (16,800 seedlings/ha.) was present on all clear-felled plots, but not on the untouched control.

3002. KÖSTLER, J. N. Plenterbestände im Bregenzer Wald. [**Selection forests in the Bregenzer Wald [Vorarlberg].**] *Cbl. ges. Forstw.* 75 (3/5), 1958 (224–56). 13 refs. [G.g.]

A detailed analysis of structure and composition of 32 stands in a mountain region S. of the Allgäu [cf. *F.A.* 19 No. 3877] classified into types rich in Silver Fir, in Beech, and in Spruce. Most of these showed a genuine selection structure, though regeneration, particularly of Fir and hardwoods, was sometimes endangered by game or cattle. Stems > 6 cm. d.b.h. varied between 436 and 1852/ha. The best structure was shown by 6 stands with a growing stock of 550–580 cu.m./ha. and a m.a.i. averaging ca. 11 cu.m. In many stands, Silver Fir surpassed Spruce in increment. The stands, most of which are owned by small peasant farmers, are thought to be well managed under public regulations and supervision, but certain possible improvements are discussed.

222. Coppice, Pollarding and Lopping Systems

See also Nos. 3004–5.

3003. LI, K.-C. [**Studies of Oak coppice.**] *For. Sci., Peking* 1958 (3), (231–47). [Chin.chin.russ.]

Results of analyses of sample stems in Oak coppice stands [no species given] showed that, after 14 years, while height growth was gradually slowing down, diameter and volume increment were both still rising. On 18 coppice sample plots between 8 and 23 years old, the stems averaged 2629/ha. of which 91·8% were < 10 cm. in d.b.h. The volume per ha. is closely related to density; e.g. in 3 highly

productive stands, volume averaged 84·6 cu.m./ha. on 3695 stems, whereas in 4 stands of low productivity, it averaged only 44·8 cu.m. on 2101 stems. An increase in the number of trees/ha. is therefore considered of high importance for increasing productivity. It is recommended that Oak coppice be felled in autumn after the growing season and before the movement of sap in the following spring. Fellings should never be made in the rainy season [summer], as stumps readily decay then, and coppice growth is less vigorous and is more liable to subsequent frost damage.

226. Changes of Silvicultural System. Conversion (by System or Species)

See also No. 3182.

3004. DAKOV, M. Metod za prevrăštaneto na čast ot izdănkovite gori v semenni i uveličavane na tjahnata proizvoditelnost (dobiva na minii podpori). **[A method of converting some coppice to high forest and increasing the yield of pitprops.]** *Izv. Inst. Gorata bălg. Akad. Nauk, Sofia* No. 2, 1957 (49–120). 22 refs. [Bulg.bulg.russ.g.]

Sample plots were established and data collected and tabulated on the condition, stem form and regeneration in coppice forests in Bulgaria, which occupy 60% of the total forest area, often the best sites. It is concluded that growth in these forests is unsatisfactory, as they provide only 6% of the building timber used, which leads to over-exploitation of the medium-aged high forest. A method of conversion is proposed, based on a 40- to 60-year rotation, since the present high-forest rotation of 100 years, frequently leads to stagheadedness and decay. The aim of the method is to concentrate increment on the largest possible number of stems capable of reaching mine-timber size (16–22 cm.). Two stages of improvement fellings are proposed: (1) when the stand is 10–25 years old, stand density is kept at $< 0{\cdot}8$ and stems incapable of growing into mine timber are removed; (2) when the first stems of mine-timber size have begun to appear (> 25 years), density is kept at $< 0{\cdot}7$ and again all stems incapable of reaching mine-timber size, even after release, are removed. The principal fellings, at ca. 40 years for *Quercus cerris*, 50 years for *Q. robur* and Beech, and 55 years for *Q. conferta*, are carried out in 3 phases over 15 years and are aimed at securing natural or artificial regeneration of the most valuable species and releasing the lower growth classes; fruiting begins early in coppice forest, usually at ca. 20 years, and any unfavourable effect of coppice shoots on regeneration may be controlled by cutting the terminal bud, manipulation of the fellings etc. After stand improvement and principal fellings in which the thickest stems are removed, the residual stems are expected to show considerable response to release, enabling them also to reach mine-timber size. The % of straight-boled trees is also expected to increase. The yield of mine timber by this method should be 40% more than from clear fellings, and in addition the coppice forest is converted into valuable mixed stands of seedling origin.

3005. POPESCU, N. Ameliorarea crîngurilor degradate de quercinee propuse a fi readuse la codru prin conversiune treptată. **[Improvement of degraded Oak coppice destined for conversion to high forest.]** *Rev. Pădurilor* 1958 (7), (386–90). 4 refs. [Rum.russ.g.f.e.]

Explains the regulations in force for the conversion of Oak coppice and describes a method in use in the Ploeşti forest division. This consists in oblique cross-cutting of stumps at root-collar level, which ensures upright, healthy regrowth from old stools. This Oak regeneration is supplemented by sowing or planting of auxiliary species, e.g. *Tilia* spp., *Fraxinus excelsior*, *Ulmus* spp., *Prunus avium*, *Acer campestre*, *Carpinus betulus*, and *F. ornus*.

228. Constitution and Composition of Stands; Choice of Species and Form of Mixture; Tree Classes; Forms of Stand

See also Nos. 2699, 3302–3, 3600–2.

3006. SMALL, D. **Some results from an investigation into the distribution of girth classes of some tropical rain forest trees, in Sierra Leone.** *Emp. For. Rev.* 37 (4), 1958 (409–17). 5 refs.

Describes a method, based on enumeration survey data, whereby the canopy class of a species may be determined by plotting its girth class distribution by 2-ft. girth classes from 6 ft., and comparing it with a similar combined distribution curve for all forest species. Emergent species, i.e. having their upper crown limits clear of all surrounding crowns and usually 140–170 ft. high, tend to have an even distribution throughout the girth classes, while the upper canopy species, i.e. ca. 100–130 ft. high, forming a dense canopy over other species, show a greater % in the lower girth classes. Emergents in Sierra Leone include *Brachystegia leonensis*, *Chlorophora regia*, *Daniella ogea*, *Entandrophragma* spp., *Erythrophleum guineense*, *Lophira alata*, *Parinari excelsa*, *Parkia filicoidea*, *Piptadenia africana* and *Xylia evansii*.

3007. KORPEĽ, Š. Prispevok k štúdiu pralesov na Slovensku na príklade Badínskeho pralesa. **[The study of natural forest in Slovakia using the example of the Badín natural forest.]** *Lesn. Čas.* 4 (6), 1958 (349–85). 17 refs. [Slovak.russ.g.]

The 21 ha. of forest, in the Kremnitz mountains of Central Slovakia, is on a N. slope at 710–780 m. alt., and belongs to the *Asperula odorata* type of *Abieto-Fagetum*. It has been protected as a reserve since 1913 but since 1947 wind has destroyed 4 ha. The condition, structure, number of trees, standing volume and natural regeneration are analysed, and conclusions drawn which may be useful for tackling problems of conversion or regeneration in Silver Fir/Beech selection forests.

3008. KÜGLER, F. Beobachtungen in unbeeinflusst erwachsenen Waldgebieten Lettlands. **[Observations on undisturbed forests in Latvia.]** *Allg. Forst- u. Jagdztg.* 130 (1), 1959 (7–11). [G.g.]

Describes observations made in the 1920's in virtually untouched stands of Scots Pine, Spruce and Birch (mostly mixed, with Pine preponderant). These were generally one-storeyed high forest with very regular Gaussian diameter distributions. Growing stock of Pine was generally about equal

to, that of Spruce rather below, and that of Birch above, Wiedemann's yield-table values for those species.

23. Regeneration and Formation of Stands

231. Natural Regeneration

See also Nos. 2943, 2983, 3000–1, 3303.

3009. MIRAMS, R. V. **Aspects of the natural regeneration of the Kauri (*Agathis australis*).** *Transactions of the Royal Society of New Zealand, Wellington* 84 (4), 1957 (661–80 + 3 plates). 49 refs. O.R.S.

Ecological studies in the Waitakere Ranges showed little natural regeneration in Kauri forest but plentiful regeneration in places where the Kauri had been felled and replaced by *Leptospermum* shrubland. To clarify this difference, studies were made of climatic and edaphic factors, and of the quantity, availability and germination capacity of the seed. Although seed-fall was plentiful, damage inflicted by an insect, *Hemideina thoracica*, largely prevented germination. Other factors restricting regeneration were: the soil moisture content at the time of germination, the rapid drop in germinative energy as a result of storage in atmospheric conditions, and damping-off of seedlings by an unidentified fungus soon after germination. Trends in the succession of vegetation are briefly discussed.

3010. PUDDEN, H. H. C. **Natural regeneration [of *Juniperus procera*].** *Rep. For. Dep. Kenya 1955/1957*, 1958 (15–6).

A systematic investigation has begun into the causes for the failure of *J. procera* forest to produce natural regeneration. Large quantities of seed were eaten after extraction from the fruit by monkeys, and about 75% of that reaching the ground was consumed by rodents. Even so, seedlings in adequate numbers for re-stocking appeared after the onset of each rainy period and, with equal regularity, died in subsequent dry periods. A few died from damping-off, but no cause other than drought could be assigned to the majority of deaths. The effects of light and of fire remain to be investigated. It is suspected that existing recent natural regeneration resulting from fire owes its existence to a fire not sufficiently severe to destroy all seed on the ground. There are several examples of *J. procera* forest fires producing no natural regeneration.

3011. CH'IEN, K.-H., and YANG, Y.-P. **[Natural regeneration of Hingan *Larix* [*L. gmelinii*] on cut-over areas.]** *For. Sci., Peking* 1956 (3), (271–7). [Chin.]

Following a general account of the species (extremely light-demanding but easy to grow under any conditions, bearing good seed every 3–5 years between 20 and 200 years of age, and seed little damaged by animals), the author stresses the possibility and urgency of natural reforestation after the heavy exploitation (data given) in 1930–40 and 1952–54 in the Great Hingan Mountains. Examination of 33 logged areas shows good Larch regeneration on 25 of them (ca. 13,500 seedlings/ha., 85% of all tree seedlings) with Birch becoming dominant after the removal of the big Larch but forming only 10% of the subsequent regeneration. As the Birch suppresses the undergrowth (in which the most dangerous to Larch is *Rhododendron dahuricum*), it is considered that the faster growing Larch can get up through the Birch and again become dominant. Data are given showing that N.E. and S.W. aspects and gentle slopes favour Larch regeneration. Recommendations are made for rational logging, treatment of felled areas, and management.

3012. HO, N.-W. **[On forest regeneration in the Great and Little Hingan Mountains.]** *For. Sci., Peking* 1958 (3), (248–63). 34 refs. [Chin.russ.]

[Cf. *F.A.* 20 No. 2994.] Opinions vary as to whether the principal species, *Pinus koraiensis*, is light-demanding or shade-seeking. The author considers it is neither, but that it is shade-tolerant and easily adapts itself to the environment. Moreover, while the literature shows that in natural stands it can tolerate shade for 40 to 140 years from at least 10 years of age, he maintains that it can also grow and develop in full light, citing: (1) investigations of A. V. Smirnov in E. Siberia [no date given] showing that *P. koraiensis* regenerates successfully in the open in full light; (2) observations at the former nursery of Tach'iao and at the experimental station at Tai-lin, on the growth and development of seedlings, showing that the tree thrives in full light, without overhead shade in summer or shelter in winter; (3) experiments in planting seedlings on clear-felled areas, these growing faster than others planted in selection-felled areas. He accordingly favours clear felling and artificial regeneration for this species. In China, stands occur principally on the S. slope of the Little Hingan Mts. Mature and overmature stands occupy 72% of the total area, and form 86·6% of the total volume. They show heavy decay, and clear felling is advocated, if only because seed-trees suffer severely from windthrow. With Larch [unspecified] regeneration can be assured on burnt and clear-felled areas if due attention is paid to site clearance and protection of seed-trees and young natural regeneration.

3013. BARNOLA GARCÍA, J. M., and ESTEVE VERA, A. **Sección de selvicultura y ordenación de montes. [Silviculture and forest management section.]** *An. Inst. for. Invest. Exp., Madrid* No. 2, 1957 (33–8). [Span.]

Studies were made on natural regeneration and/or the lack of it in (1) *Pinus nigra* stands of Cazorla and Segura (Jaén), (2) *P. nigra* stands of Cuenca, and (3) the Beech forests of Navarre, and plans are outlined for future experiments to study the effects of natural factors and of various ancillary measures (e.g. burning) on natural regeneration in these areas.

3014. SURMAČ, G. P. **O vozmožnosti estestvennogo vozobnovlenija sosny v Kamyšinskom massive. [The possibilities for natural regeneration of Pine in the Kamyshin massif [Lower Volga region].]** *Lesn. Hoz.* 11 (5), 1958 (71). [Russ.]

Lack of water in the upper layers of soil under the Pine stands renders natural regeneration very

uncertain. Experiments in which seedlings were isolated by a trench 70 cm. deep, showed that when competition for water by the roots of adult trees was removed, the regeneration flourished.

3015. BRENDER, E. V., and DAVIS, L. S. **Influence of topography on the future composition of Lower Piedmont forests.** *J. For.* 57 (1), 1959 (33–4).

Much of the area was originally covered by Oak/Hickory forests, which were cleared for agriculture. Where the land was later abandoned, Loblolly Pine colonised it, but on many sites hardwoods come in soon after the Pines reach sapling size. The following trends can be observed: on all gentle upper slopes and moderate upper S.W. slopes Pine can usually be regenerated without controlling the hardwoods; on steep upper S.W. slopes, moderate upper N.E. slopes and all moderate lower slopes Pine can be regenerated provided that hardwoods are controlled; on steep upper N.E. slopes, all steep lower slopes, and in bottoms, Pine will be difficult, and perhaps unprofitable, to regenerate, because of hardwood competition.

3016. DALE, M. E. **Ground treatment and seed supply influence establishment of Shortleaf Pine reproduction.** *Sta. Note Cent. St. For. Exp. Sta.* No. 119, 1958. pp. 2. 1 ref.

In recently logged Oak/Pine stands on the Cumberland Plateau, the number of Pine seedlings on bulldozed plots one year after treatment was three times that of control plots, and higher with 15 than with 6 seed-trees/acre, viz. 9900 *vs.* 7500 seedlings/acre. Disking also produced a significant increase, though less than bulldozing. The number of seeds (measured by seed traps) for each surviving seedling one year after seed-fall is shown. Hardwood sprouts averaged 6100/acre on bulldozed plots and 10,400 on disked plots; it remains to be seen whether they will overtop the Pines. [Cf. *F.A.* 19 No. 1582.]

3017. MORRIS, W. G. **Influence of slash burning on regeneration, other plant cover and fire hazard in the Douglas-Fir region. (A progress report.)** *Res. Pap. Pacif. Nthwest. For. Range Exp. Sta.* No. 29, 1958. pp. 49. 21 refs.

A comparison was made of the surface cover, % stocking of seedlings, brush and herbaceous cover, and fire resistance on 63 paired plots, on which slash was either (1) left after logging or (2) burnt, established in 1946–52 after patch fellings in the Cascade range and in the coastal district of Oregon. The stocking of coniferous, mainly Douglas Fir, seedlings was not significantly different in (1) and (2) but significantly higher on (2) in the coastal region than in the Cascades. Fire resistance was greater in (2) for $\geqslant$ 5 seasons after slash burning. [Cf. *F.A.* 18 No. 2970.]

3018. TRYON, E. H., and CARVELL, K. L. **Regeneration under Oak stands.** *Bull. W. Va. agric. Exp. Sta.* No. 424 *T*, 1958. pp. 22. 7 refs.

Analyses data from 28 permanent and 40 temporary sample plots in mixed Oak woods in W. Virginia. The (unexpectedly heavy) reproduction varied considerably, averaging 39,000 individuals/acre, among them ca. 6000 Oaks. Red Maple predominated among some 50 species, but had the highest first-year mortality. About $\frac{1}{3}$ of the area had at least 2500 Oaks aged 1 year or more, but plants $>$ 1 ft. tall were much fewer. White Oak preponderated in the reproduction, as in the stands, though the amount of White Oak seed produced was less than that of Red Oak. There were no significant differences in acorn production between abundantly and poorly regenerating plots. *From authors' summary.*

3019. BOONKIRD, S., and UNAHANAND, P. **[Report of the result of experiment on Teak regeneration.]** *Vanasarn* 17 (1), 1959 (9–14). [Siam.e.*e.*]

In statistical experiments in two districts of N. Siam, replicated plots were laid out in natural Teak forest as follows: (1) undergrowth removed, (2) undergrowth burnt, (3) undergrowth removed and soil broken to 20 cm. depth, (4) combination of cutting and burning undergrowth with soil cultivation, (5) control. Assessment of results after a year showed no significant difference in number or size of Teak regeneration as between treatments or the control.

3020. **Karri [*Eucalyptus diversicolor*] silviculture: germination and establishment: the effect of burning on regeneration.** *Rep. For. Dep. W. Aust. 1957/58*, 1958 (26).

Germination recorded in autumn 1957 averaged 10% over all seedbeds investigated; 30% of total seed germinated on new ash beds, 7–15% on receptive top soil, and 3% on unreceptive seedbeds. Seedling mortality in the ensuing 12 months reached 72%, and total % losses were similar on different seedbeds. Ash-bed effect was remarkable; weed competition was substantially reduced and dominant Karri seedlings grew 5 ft. in height per annum. The nature and timing of advance and regeneration burning have been examined in relation to establishment on widely different seedbeds. Regeneration is more certain and more effective where a running fire can cover the whole of a logged area. Advance burning, regarded as a necessary tool to facilitate effective tree-marking and to minimize fire risk in subsequent logging operations, should be effected only under mild conditions and during seed-years. A proportion of regeneration established on the advance burn will survive logging; regeneration of the area will be completed after the burning of logging debris.

232. Artificial Regeneration

See also Nos. 2881, 3143.

3021. ISAAC, L. A. **Report to the Government of Turkey on reforestation.** Expanded Technical Assistance Program, FAO, Rome. *FAO Report* No. 932, 1958. pp. 9 + vii + 87 + 15 photos, 16 dgms. 54 refs. Limited distribution.

The greater part of this report (87 pp.) consists of a manual of nursery practice and tree planting, including seed collection, storage and treatment, as well as all branches of nursery and planting practice.

232.1. Choice and Trial of Species, Races etc.

See also Nos. 2699, 2986, 3128 *et seq.*

3022. JEFFERS, J. N. R. **Design of Poplar experiments.** *For. Rec. For. Comm., Lond.* No. 38, 1958. pp. 19. 5 refs. Price 1*s.* 9*d.*

The work carried out by the Research Branch of the British Forestry Commission since 1948 has suggested that there are special features in the design of Poplar experiments that do not appear to be adequately described in published literature. It is the purpose of this Record to make available the conclusions reached during the past 10 years.

3023. GAMBI, G. Il pioppo bianco della Lucchesia. **[The White Poplars of the Lucca region of Tuscany.]** *Monti e Boschi* 9 (12), 1958 (659–65). [It.f.e.]

Describes the two local varieties [*Populus alba* vars. *nivea* and *peronea*], which are much more resistant to insect damage than the hybrid Black Poplars, and give a satisfactory yield (mean annual yield ca. 20–25 cu.m./ha.). Mixed stands of this Poplar and *Alnus glutinosa* are recommended.

232.11. Species Trials, including Forest Gardens, Trials of Exotics etc.

See also Nos. 2871, 2882, 3186.

3024. RANNERT, H. Zur Inventur der fremdländischen Baumarten in Österreich. **[Notes on the Austrian survey of exotics.]** *Cbl. ges. Forstw.* 75 (3/5), 1958 (284–97). 5 refs. [G.]

It is hoped that the survey will, *inter alia*, salvage some of the information available in the 600 or so small plots established by Cieslar in the 19th century in many parts of the old monarchy with > 30 species, which were last written up in 1919 and have been greatly neglected. This paper presents data for Carinthia on the occurrence of *Pinus strobus* (the most important exotic), *Larix leptolepis*, *Pseudotsuga taxifolia*, *Abies nordmanniana* and *Quercus borealis* (the last two recent introductions).

3025. ZAVADIL, Z. Pěstování korkovníku amurského v plantážích. **[Growing *Phellodendron amurense* in plantations [in Czechoslovakia].]** *Sborn. čsl. Akad. zeměd. (Lesn.)* 4 (10), 1958 (857–76). 21 refs. [Cz.cz.russ.g.]

Discusses the ecology, biology and phenology of the species, chiefly on the basis of Russian literature, and gives some data on trial plantings in various parts of the country, mostly with Russian seed, and generally interplanted with shrubs and nurse species in varying spacings and proportions. It is concluded that the species is suitable for growing in plantations in Czechoslovakia, preferably on rich, permeable, well aerated soils. Careful tending is advisable in the early years, including weeding, hoeing, pruning, even complete cutting back of unsatisfactory stems (which coppice readily from the root stock). This should ensure satisfactory growth and stem form, a clear bole of at least 3 m. being thought essential for cork and timber production.

3026. ZARĘBA, R. Obecny stan powierzchni doświadczalnych z egzotami w Wirtach. **[The state of the Wirty exotic trial plots today.]** *Sylwan* 102 (2), 1958 (45–61). 9 refs. [Pol.]

Tabulated data and notes on the species tried, which include *Abies nobilis*, *A. concolor*, *Pseudotsuga taxifolia*, *Quercus borealis*, *Thuja plicata*, *T. occidentalis*, *Larix leptolepis*, *Chamaecyparis lawsoniana*, *C. pisifera*, *Tsuga sieboldii*, and *Picea sitchensis*.

3027. JANKAUSKAS, M. Maumedžiai Lietuvos TSR miškuose ir parkuose ir jiems auginti perspektyvos. **[Larch in the forests and parks of Lithuania and the prospects for its cultivation.]** Gosudarstvennoe Izdatel'stvo Političeskoj i Naučnoj Literatury, Vilnius. 1954. pp. 258. [Lith.] From *review* by *J. Kuprionis* in *Girios Aidas* 8 (15), 1957 (46–9, 107–8). [Lith.e.]

The book is well produced, but the illustrations are generally of moderate quality. European Larch is found all over the country in 189 localities, Siberian Larch in 14, Japanese Larch in 10, Polish in 3, Kurile Larch, *Larix* × *eurolepis* and *L. laricina* each in 2, singly or in groups with other species. The largest single stand is of European Larch covering 10·9 ha. in Paežeriu Forest. All existing Larch in the country has been planted. Data from 22 sample plots show that at 100 years European Larch averages 38 m. in height with a mean diameter of 47 cm. [b.h.?] (the tallest Norway Spruce in the country is 42 m. high) and a m.a.i. of 11·3 sq. m./ha., compared with a general average of 4 sq. m./ha. for all Lithuanian forests. European, Polish and Siberian Larch regenerate naturally, the latter the most prolifically. The Institute of Forest Management plans to plant 8850 ha. of Larch in the 15-year period beginning 1954.

3028. DEMENT'EV, P. I. Geografičeskie posadki listvennicy v Bronnickom lesničestve. **[Provenance and species trials of Larch in Bronnitsy forest district [S.W. of Moscow].]** *Lesn. Hoz.* 10 (2), 1957 (53–60). [Russ.]

Reports progress up to 1955 of various species and provenances of Larch (all from the U.S.S.R.) grown from seed sown mostly in spring 1952 and planted out in 1954. Species represented are *Larix sukaczewii* (14 provenances), *L. sibirica* (16), *L. gmelinii* (4), *L. decidua* (5), *L. leptolepis* (1), and *L. czekanowskii* (1). The Larches were planted out in pure stands and in mixtures with *Picea abies*, *Pinus sylvestris*, *Acer platanoides*, or *Tilia cordata*. In 1955 the best mean heights were exhibited by a *L. decidua* provenance from the Moscow region (66 cm.), *L. sibirica* from the Omsk region (62 cm.), and *L. sukaczewii* from the Sverdlovsk region (61 cm.) and the Kirov region (60 cm.).

3029. ROVSKIJ, V. M. Ob ulučšenii porodnogo sostava sredneaziatskih tugaev. **[Improving the species composition of the Central Asian riparian woodlands.]** *Lesn. Hoz.* 11 (5), 1958 (71–2). [Russ.]

The indigenous tree species in Central Asia, found mainly along river banks, are *Populus* spp. of the Section *Turanga*, *Salix* spp. and *Elaeagnus angustifolia*, none of which attains > 15–20 m. even under the best conditions. Trials have shown that *Robinia pseudoacacia*, *Fraxinus americana*, *Ailanthus*

altissima, *Morus* sp., *Ulmus* '*campestris*', *Populus alba* var. *pyramidalis* and *P. nigra* will grow well under these conditions. Work begun in 1957 at SredazNIILH, Tashkent, on Poplar hydridization has also resulted in a promising *Populus alba* × *P. diversifolia* hybrid, which is now undergoing trials at Ashkhabad and Khiva.

3030. YÜAN, Y.-L. **[The growth of a few Eucalypts in [the town of] Canton.]** *For. Sci., Peking* 1956 (1), (3–21). 27 refs. [Chin.]

Some groups and isolated individuals of 5 species or varieties, but mostly *E. punctata*, were studied, ages, heights and d.b.h. being listed. Stem analyses are also presented for one sample tree of each species, ranging between 16 and 25 years, the results being set out in detail.

3031. SAATÇIOĞLU, F., and PAMAY, B. Tarsus-Karabucak mıntıkasında okaliptüs (*E. camaldulensis* = syn. *E. rostrata*). [Tesis çalışmalarının 20 yıllık neticeleri üzerine silvikultürel araştırmalar. **[*Eucalyptus rostrata* in the Karabucak-Tarsus region, based on 20 years of silvicultural research.]** *Istanbul Üniv. Yay.* No. 782 (*Orm. Fak.* No. 59), 1958. pp. 192. 44 refs. [Turk.f.]

Discusses the soils, climate, and performance of the *E. rostrata* plantations, the oldest of which are ca. 20 years. Though the species flowers and fruits, and has stood frost well, it seems to be at the limit of its possible range at Karabucak, and 17 other possible species are suggested for trial. The root system, spacing, nursery work, tending, types of plantation, increment etc. of the plantations are discussed. There is a 10-page French summary.

3032. GUPTA, M. **A note on some Australian *Eucalyptus*, their suitability for planting in U.P. and the results of trials done.** *Bull. U.P. For. Dep.* No. 30, 1957. pp. 5.

Recommends species for each of 5 zones of Uttar Pradesh, classifies them by chief use, and reports in detail on *E. rostrata*, *E. tereticornis*, *E. rudis*, *E. saligna*, *E. sideroxylon*, *E. melanophloia*, *E. microtheca* and *E. marginata*, raised and put out in a plains nursery.

3033. L'*Eucalyptus*: (1) à Madagascar, (2) en Afrique du Nord. **[Eucalypts: (1) in Madagascar, (2) in North Africa.]** *Rev. int. Bois* 25 (247), 1958 (227–8). [F.]

A short general note on Eucalypts in Madagascar, and individual notes on *Eucalyptus viminalis*, *E. rostrata*, *E. globulus*, *E. gomphocephala*, *E. cornuta* and *E. diversicolor* in N. Africa.

3034. WILLAN, R. G. McK. **Seventh British Commonwealth Forestry Conference Australia and New Zealand 1957. Note 2—The genus *Eucalyptus*.** *Nyasald. Fmr. For.* 4 (3), 1958 (17–28). 3 refs.

The Chief Conservator of Forests, Nyasaland, makes recommendations from personal experience in Australia for species suitable for timber, poles and fuel, and for nursery practice and planting in Nyasaland.

3035. DURAND, J.-H., and SIMONNEAU, P. Les périmètres irrigables expérimentaux du Sahara occidental. **[Experimental irrigated areas in the Western Sahara.]** *Repr.* from *Terres et Eaux, Paris* No. 31, 1958 (10–33). 7 refs. [F.e.span.]

Describes, with illustrations, soils, vegetation, irrigation, cultivation etc. of experimental plots on saline and non-saline *reg* [low-lying sands, often pebbly] and more or less saline alluvia, in S. Oran, Algeria. In tree planting trials for shelterbelts and fuel plantations, good results were obtained with *Cupressus sempervirens*, *Casuarina equisetifolia* (which, however, suffered from locusts), *Cassia eburnea*, *Elaeagnus angustifolia* (which has adapted itself well to the saline soils), *Parkinsonia aculeata* and *Eucalyptus occidentalis*. The last named, however, suffered from wind breakage in exposed situations if it had grown too fast.

3036. **[Species trials.]** *Jversl. Landsbosbeh., Paramaribo* 1957 (59–71 + 7 tbls., 3 photos). [Du.]

Presents some results of height-increment measurements over the last 10 years in plantations of native and exotic species having soft, easily worked timber in the new and old coastal plantations of Mijnzorgweg and Palissadenweg and the old Zanderij plantations.

3037. ZAPPI, C. V. Observaciones sobre el comportamiento y crecimiento del *Populus euramericana* 'monilífero' en el Delta del Paraná. **[The behaviour and growth of *P.* × *canadensis* 'monilifero' in the Paraná Delta.]** *Rev. for argent.* 2 (4), 1958 (123–6). [Span.]

Presents data illustrating the growth of *P.* × *canadensis* 'monilífero', a clone of *P.* × *robusta*, the data being taken from 2 plots in the Paraná Delta near the R. Sauce: (1) 8 years old [area not specified] and (2) 4 years 7 months old on an area 30 × 50 m. The clone is highly suitable for low-lying sites, and is comparable in behaviour and wood characteristics to *P.* × *canadensis* cv. 214.

3038. El pino Oregón. **[Douglas Fir.]** *Boletín Forestal, Plan Chillán, Chillán* No. 7, [1956?]. pp. 12. [Span.]

Discusses the adaptability, performance, timber characteristics, and uses of *Pseudotsuga taxifolia*, recommending its planting in several areas in Chile and discussing optimum environmental conditions. [Cf. *F.A.* 15 No. 1261.]

3039. BURSTALL, S. W. **Exotic trees in New Zealand.** *Scot. For.* 13 (1), 1959 (52).

Gives d.b.h. o.b., height, d.o.b. at half-height, total stem volume, and approximate age, of 14 exotics outstanding for their size: two *Pinus radiata* (the tallest trees), and single specimens of 12 other coniferous species.

3040. OLSEN, P. F. **Some notes on the introduction of Eucalypts into the South Island.** *N.Z. J. For.* 7 (5), 1958 (123–7). 35 refs.

The problem of collection of reliable historical data is reviewed and the early introduction of the Eucalypts outlined. An historical survey of the spread in use and popularity, mainly of *Eucalyptus globulus*, is given. The effect of insect epidemics on the popularity of the genus is noted.

232.12. Races and Provenance Trials

See also section 165.3/.7 and Nos. 2914, 3028, 3545.

3041. LANGNER, W. Planung und erste Ergebnisse eines Japanlärchen-Provenienzversuches mit zugleich züchterischer Zielsetzung. [**Planning and first results of provenance trials with *Larix leptolepis*, designed with a view to breeding.**] *Cbl. ges. Forstw.* 75 (3/5), 1958 (168–96). 18 refs. [G.g.]

Describes lay-out, international co-operation etc. for long, medium and short-term trials with seed from 25, and scions from 29 natural stands, supplied by Meguro research station. Preliminary tests indicate differences among provenances in germination behaviour, early growth, habit and, in particular, phenology.

3042. SÆTERSDAL, L. S. **Investigations on respiration and assimilation rates of various provenances of Norway Spruce (*Picea excelsa*) [*P. abies*] in winter and spring.** *Årbok, Universitetet i Bergen (Naturvitenskapelig Rekke)* No. 6, 1956 (1957). pp. 46. 10 refs. [E.e.] L.S.

The assimilation/respiration balance was more favourable in German (Harz and Thuringia) than in Scandinavian (N. Sweden and E. Norway) provenances for both 2- and 4-year-old plants grown in W. Norway.

3043. KRAHL-URBAN, J. Vorläufige Ergebnisse von Buchen-Provenienzversuchen. [**Preliminary results of Beech provenance trials.**] *Allg. Forst- u. Jagdztg.* 129 (11/12), 1958 (242–51). 10 refs. [G.g.e.]

First results, covering only some of the 7100 (mostly German) provenances planted since 1950 on 14 plots in W. Germany north of the Main, indicate the existence of local differences in weight of Beech nuts, height growth, survival, Lammas-shoot formation and phenology, the last showing a connexion with altitude.

232.13. Trials of Hybrids and Other Products of Tree Breeding

See also section 165 and No. 2913.

3044. MITCHELL, A. F., and FERGUSON, J. L. F. **An early plantation of hybrid Larch.** *Scot. For.* 13 (1), 1959 (53–4).

Describes a stand of *Larix* × *eurolepis* apparently planted in 1914 at Murthly Castle, in Scotland. The largest trees are > 95 ft. high and > 5½ ft. g.b.h.

3045. KIELLANDER, C. L. Hybridlärk och lärkhybrider. [***Larix* x *eurolepis* and other Larch hybrids.**] *Svenska SkogsvFören. Tidskr.* 56 (4), 1958 (371–98). 46 refs. [Sw.sw.]

Deals chiefly with the history, performance etc. of *L.* × *eurolepis* on the basis of the literature, with recommendations on its use and treatment, and some data on trial plots, in S. Sweden, particularly at Ekered, where 10-year-old *L.* × *eurolepis* were superior to the best *L. decidua* provenance (from Denmark—presumably a Sudeten strain) and to *L. leptolepis* having the same ♂ parent. Work, in progress or planned, on mass production of seed of this hybrid, and breeding of other crosses with *L. sibirica* as one parent, is briefly described.

232.2. Preparatory Work. Auxiliary Measures

See also Nos. 2700, 3114–5, 3128, 3305 *et seq.*

3046. DESOUCHE, J. Essai de matériels mécaniques pour reboisements de friches calcaires en Saône-et-Loire. [**Test of mechanical equipment for afforestation of calcareous wasteland in Saône-et-Loire.**] *Rev. for. franç.* 11 (1), 1959 (41–9). [F.]

Various methods of planting these rocky calcareous soils were tried: (1) Digging planting holes for *Pinus nigra* var. *austriaca* and making small craters with explosives for *Cedrus atlantica*; but both were expensive and gave very variable results. (2) Bar-planting on hand scalped patches, which had the same disadvantages as (1). (3) Using a 'Polyculteur à tarière Collet' [a cultivator-cum-auger, cf. *F.A.* 13 No. 283] which scalps a continuous strip 40 cm. wide and digs holes 30 cm. deep and 20 cm. in diam.; this machine was not sufficiently powerful for the conditions and many holes were incomplete. (4) Using a scalping machine (type 'Buteur décapeur Raviot') which removes a continuous strip of turf, 40 cm. wide and 5–6 cm. deep, which it divides and throws to either side, followed by deep ploughing on the scalped strip (using a 'sous-soleuse type Fondeur'). Planting can then be done by machine with no further soil preparation. Total planting costs by this method, including cost of planting stock, were Fr.80,500/ha. and results were excellent—90% survival after 3 years and increment much superior to that of plantations made by other methods.

3047. FERGUSON, E. R. **Plows for woods planting.** *Sth. Lumberm.* 197 (2465), 1958 (92–3).

Describes a 'one-step' method of site-preparation and planting of Pine seedlings, by fitting a V-blade 'brush plough', for clearing lanes 6 ft. wide of shrubby vegetation and coarse grass, to the tractor that pulls the planting machine. Evaluation of 6 operations in S.E. Texas showed that survival of seedlings was generally better than where the plough was not used, except where cattle used the cleared lanes as paths.

3048. SCHRÖDER, H. Produktionssteigerung durch Waldfeldbau. [**Raising production by tree planting with field crops.**] *Forst u. Jagd* 8 (5; 6), 1958 (225–7; 248–51). 2 refs. [G.]

A detailed report of 1956 and 1957 trials in raising Beech, Pine and Poplar with field crops on Mecklenburg ground-moraine soils. One-year Pine and Beech were planted at 1·2 × 0·33–0·4 and 1·2 × 0·4 m. respectively, and two-year Poplar (with Pine) at 5 × 5 m. The cash return from the maize and tobacco sown in 1956 repaid the cost of ground preparation (shallow disking without stumping), hand cultivation and harvesting. Tree height-growth was improved by 4–12%. In 1957 the trial was extended to 25 ha. with mechanical sowing and horse-drawn cultivation (to reduce hand labour) of a variety of crops (to even out labour demand). For this purpose the % area recommended is (*a*) potatoes 15, (*b*) tobacco 40, (*c*) artichokes 30 and (*d*) silage

maize 15. For (*a*), the lay-out is one row (ridged) between tree rows; for (*b*), as for (*d*). For (*c*) a single inter-row is planted between shade-bearers, particularly Beech; after harvesting the tops for silage and the tubers for fodder, the earth is re-ridged for successive crops. For (*d*) a single inter-row is sown between light-demanders, or two rows between shade-bearers.

3049. FLÖHR, W. Über die Qualität künstlich begründeter Buchenbestände. [**The quality of artificially regenerated Beech stands.**] *Forst u. Jagd* 8 (10), 1958 (453–7). 5 refs. [G.]

Describes, with stand data, quadrat charts and profiles drawn to correct scale for height and crown dimensions, the satisfactory condition of 50- to 55-year-old Beech stands raised on open ground or below an open Beech stand, cropped with potatoes. Their freedom from frost damage, which generally precludes the open planting of Beech, is ascribed to the lack of weeds.

3050. SCH. Forstwirtschaft in unterentwickelten Ländern. Der Anfang in Äthiopien. [**Forestry in underdeveloped countries. Beginnings in Abyssinia.**] *Allg. Forstztg.* 70 (1/2), 1959 (10). [G.]

A preliminary account of afforestation trials. *Ricinus* [*communis*?] is planted for 2 years as a nurse crop for the main species, *Eucalyptus globulus* and *Juniperus procera*, meanwhile providing soil stabilization, fruit, and wood for fuel and later, possibly, for pulp. A yield of 50 cu.m./ha. is expected. The main crop is likely to suppress the *Ricinus* in the third year, but careful tending may be necessary to prevent the latter from becoming a weed.

232.3. Seed, Nursery Practice, Direct Sowing

232.31. Seed

See also Nos. 2904, 3078.

232.311. Seed Production (Seed Years, Seed Crops; Seed Orchards and Methods of Inducing Seed Production)

See also Nos. 2795, 3085.

3051. CAPPELLI, M. Note preliminari sulla produzione individuale di strobili in *Pinus pinea* L. [**Preliminary notes on individual production of cones in *P. pinea*.**] *Ital. for. mont.* 13 (5), 1958 (181–203). 14 refs. [It.f.]

A study was made of cone production on 400 trees of *P. pinea* in even-aged stands of 30–35 years on the Tuscan coast, in order to determine the relation, if any, between cone production and (1) d.b.h., (2) total height, (3) crown diameter, (4) crown density, (5) branch angle, (6) branch diameter, (7) crown class, (8) basal area, and (9) crown area. A high degree of correlation was found between cone production and (1) and (3). The most productive trees had rather sparse crowns and fine, almost horizontal branches. Production was highest in dominants, less in subdominants, and least in suppressed trees. The bearing of these findings on management of *P. pinea* for the production of edible 'Pine kernels' and on the choice of plus trees for breeding is discussed.

3052. MÁTYÁS, V. Tölgymakktermésbecslési kísérletek. [**Advance estimates of acorn crops.**] *Erdészettud. Közl., Sopron* 1958 (1), (161–85). 6 refs. [Hu.hu.russ.e.g.*russ.e.g.*]

Describes a system of prognostication based on various indexes—proportion of fruit-bearing branches per tree, number of acorns per 1 m. of branch etc.—which gave satisfactory results when compared with test counts in the autumn and the visual rating by forest officers. The proportion of acorns found to be damaged by *Balaninus* sp. was very high (> 40% in nearly half the samples tested). [Cf. *F.A.* 18 No. 2738.]

3053. ŠAFAR, J. Osnovna razdioba područja Hrvatske na sjemenarske jedinice. [**A basic division of Croatia into seed-producing regions.**] *Šum List* 82 (10), 1958 (329–38 + 1 map). [Croat.croat.g.]

Presents, as the result of a preliminary attempt to divide Croatia into seed-producing regions, a 1 : 2,500,000 map showing the lowland, highland, mountainous, coastal deciduous and coastal evergreen areas.

3054. PERRY, T. O., and WANG, C.-W. **The value of genetically superior seed.** *J. For.* 56 (11), 1958 (843–5). 4 refs.

Illustrates the value of such seed by calculating the increased profits from pulpwood production obtained by using growing stock of various degrees of genetic improvement (from 0·5% to 50%) on a 25-year rotation; and shows the period (in years) which it is justifiable to wait in order to plant genetically average in preference to genetically inferior seed.

3055. MATTHEWS, J. D. **Production and use of superior tree seed in Britain.** *Quart. J. For.* 53 (1), 1959 (12–22). 15 refs.

Discusses the International Seed Campaign launched by F.A.O., and the efforts being made in Britain to identify superior varieties of forest trees, to produce seed of these varieties, and to certify the quality and origin of tree seed.

3056. Elenco dei boschi iscritti al 'libro nazionale boschi da seme'. [**List of woodlands registered in the 'national seed-stand book'.**] *Boll. Corpo for. Stato* 1958 (8), (606–11). [It.]

Lists 69 registered seed stands in Italy, (*a*) by locality, (*b*) by species.

3057. HOFFMANN, K. Die Aufnahme von Auslesebäumen als Grundlage für ihre genetische und physiologische Beurteilung. [**The study of plus trees as a basis for their genetic and physiological assessment.**] *Züchter* 28 (6), 1958 (257–62). 33 refs. [G.g.] E.M.B.

Discusses the need for detailed morphological, physiological and anatomical studies of trees selected as seed-trees and for breeding on a phenotypic basis, and, with an example showing data recorded, the use of punched cards at Waldsieversdorf to record such information.

3058. ZOBEL, B. J., *et al.* **Seed orchards—their concept and management.** *J. For.* 56 (11), 1958 (815–25). 104 refs.

Discusses costs, site, establishment, spacing, maintenance, yields, flower stimulation, and diseases, using N. American and European literature sources.

3059. HADDERS, G., and ÅHGREN, A. Kott- och fröproduktion samt frökvalitet hos 12-åriga ympträd av tall. **[Cone and seed production and seed quality of 12-year-old grafted Scots Pine.]** *Svenska Skogsv-Fören. Tidskr.* 56 (4), 1958 (455–68). 9 refs. [Sw.sw.e.]

Analyses the harvests from 4–6 trees from each of 14 clones derived from plus trees growing at 225–700 m. alt., grafted in 1946 and planted in 1949 at Nedansjö (Västernorrland). Cone crops varied considerably between years and clones, with a mean of 86·8 cones per tree in 1957, when some trees had hardly any and others > 200. Cone size and shape also varied considerably between clones. Mean number of full seeds per cone was only 13·2, clone means varying from 4·4 to 20·7. Seed weights and germination %s were high for clones from high altitudes, markedly better than in their natural ranges.

3060. REINES, M., and GREENE, J. T. **Early cone production in Loblolly Pine.** *J. For.* 56 (11), 1958 (855). 4 refs.

Records a 21-year *Pinus taeda* at the University of Georgia, seeds of which produce seedlings that bear mature cones at 4 years of age. The uses of this and similar early-flowering phenotypes in tree-breeding programmes are outlined.

232.312. Seed Collection, Extraction and Grading (including Seed Weight)

See also No. 3073.

3061. JOHANSEN, R. W., and ARLINE, L. **An idea in truck-mounted ladders.** *J. For.* 56 (11), 1958 (852–3).

An illustrated description of 40- to 50-ft. aluminium ladders and their use in seed collection.

3062. GODDARD, R. E. **Additional data on cost of collecting cones from a seed production area.** *J. For.* 56 (11), 1958 (846–8). 4 refs.

Data on the 1957 collection (i.e. in the third year after release in May 1955) provide a sounder basis for computing costs than do the 1955 data [cf. *F.A.* 18 No. 1501]. An average of 634 cones per tree was obtained from 75 Loblolly Pines. The costs of collection were: $4.77 per bushel of cones (110 bushels in all), and $3.14 per lb. unextracted seed. On the basis of collection time for individual trees, the study indicates that costs could be reduced by limiting collections to trees having ⩽ 300–400 cones.

3063. HERMELIN, J. Grobarhet hos tallfrö av skilda kvalitetsklasser efter behandling med olika temperatur och fuktighet. **[Germination capacity of Scots Pine seed of different grades following treatment at varying temperatures and humidities.]** *Svenska SkogsvFören. Tidskr.* 56 (4), 1958 (448–54). 5 refs. [Sw.sw.g.]

Seed from Västerbotten, sorted by X-ray into 3 maturity classes, was first subjected for 16 hours to temperatures from 50 to 100° C., at r.h. 100% and at r.h. 0%, in batches of 50, and then allowed to germinate at 24–27° in 1000 luxes for 50 days. At r.h. 0%, germination dropped markedly at 60°–70° for the least mature class, and at 80–90° for the most mature. At 100% r.h. all seed was strongly affected at 50°, the less mature losing nearly ½ of their germination capacity, and at 60° all seed was killed.

3064. SOLOV'EV, V. A. Obeskrylivanie semjan hvojnyh porod vodnym sposobom. **[De-winging conifer seeds by a method using water.]** *Lesn. Hoz.* 10 (2), 1957 (69–71). [Russ.]

The method involves soaking, drying, screening, and stirring. Apparatus has been built specially for it.

232.314. Seed Purchase, Trade and Transport (including Seed Certification and Legislation for this Purpose)

See Nos. 3055–6.

232.315. Seed Storage and Treatment

See also Nos. 3088, 3091.

3065. CLAUSEN, K. E., and RUDOLF, P. O. **Germination of 29-year-old Red Pine seed.** *Minn. For. Note* No. 72, 1958. pp. 2.

Pinus resinosa seed of the 1928 crop was stored in glass jars in (1) fruit cellar (32–68° F.), (2) cold room (41–50°), (3) attic (0–100°), and tested in 1930, 1936, and 1940. In 1940 (after 10 years) original viability remained in (2), but had dropped to ½ in (1) and ⅓ in (3). Further tests in March 1958 showed some viability remaining in seed from all treatments —almost equal for (1) and (2), but much less for (3).

3066. T'AO, C.-A. **[Preliminary observations on the germination of 13 tree species, including White-bark Pine, by burying [in pots] in wet sand.]** *For. Sci., Peking* 1956 (1), (48–54). [Chin.]

The species included *Pinus bungeana*, *P. tabulaeformis*, *Thuja orientalis*, *Acer negundo*, *Catalpa speciosa*, *Pyrus betulaefolia*, *Tilia parvifolia*, *Amorpha fruticosa*, *Koelreuteria paniculata*, *Broussonetia papyrifera* and *Fraxinus* sp. Their seed, put in earthenware pots, was buried > 1 m. deep in a nursery bed and covered with soil, aeration being assisted by bundles of wheat-straw set upright in the soil. After overwintering (Nov. 20–March 30) the seeds were taken out and germinated in a nursery bed, with very variable results (tabulated).

3067. CHANG, Y.-L. **[Preliminary experimental report on the exotic species *Eucommia ulmoides* Oliv.]** *For. Sci., Peking* 1956 (3), (243–9). [Chin.]

Tu-chung (*E. ulmoides*), now widely scattered through central China, is highly valued for its latex. The author describes in detail the nursery techniques found successful (including the storing of seed, stratified in sand in shallow trenches, and observations on seedling and transplant development), gives the average height at 2 years as 2·3 m., and recommends a far wider use of the species on account of its value and great adaptability.

3068. GROSE, R. J. **Notes on the influence of stratification at constant temperature on the germination of *Pinus radiata* D. Don.** *Plantat. tech. Pap. For. Comm. Vict.* No. 5, 1958 (8–10).

Samples from 8 seed-lots were stratified at 40° ± 1·5° F. for 8 weeks and then germinated at 80°. Mean germination % after 15 days was 89·2 *vs.* 40·8% for unstratified seed.

3069. MESSER, H. Über die Behandlung des Forstsamens vor der Aussaat. **[Pre-treatment of tree seed.]** *Forst- u. Holzw.* 14 (3), 1959 (47–50). 12 refs. [G.g.]

Discusses stratification (short- and long-term), soaking, and mechanical treatment of seed, and gives notes on recommended methods of pre-treating seed of *Tilia cordata*, *Carpinus betulus*, *Fagus sylvatica*, *Pseudotsuga taxifolia* and *Pinus strobus*, all species with dormant seed.

3070. EISENHUT, G. Keimung der Lindenfrüchte. **[The germination of *Tilia* seeds.]** *Forstwiss. Cbl.* 77 (11/12), 1958 (348–56). 13 refs. [G.g.]

Investigations have shown that the main obstacles to germination in *Tilia* seeds are the poor permeability of the seed-coat and the endosperm surrounding the radicle, which hinders its development. Cutting the seed removes these obstacles. The splitting of the endosperm by the radicle is not due to growth, but rather to the difference in water absorption, and hence swelling, between endosperm and embryo. Germination % is reduced by darkness. Cut seed of both *T. platyphyllos* and *T. cordata* germinated best at 5° C.; temperatures of 15–25° resulted in quicker germination but a lower germination %. Enriching the moisture in the germination trays with lipase gave a germination % higher than controls at 10°, but a lower one at 25°.

3071. GARCÍA SALMERÓN, J., and BAÑO BREIS, F. DEL. Influencia de los compuestos de amonio cuaternario en la germinación de semillas de *Pinus halepensis* Mill. **[The effects of quaternary ammonium compounds on the germination of seeds of *P. halepensis*.]** *Montes, Madrid* 14 (83), 1958 (379–83). 3 refs. [Span.]

In attempts to find a compound that will maintain seed free from fungi during germination [cf. *F.A.* 20 No. 411] and yet permit normal development of the embryo, experiments were carried out with dimethylbenzyldodecyl ammonium chloride in aqueous solutions. Seeds were immersed for 30 min. in the following solutions (parts/1000): 0·05, 0·5, 1, 2, 3, and 4, and counts made of seed germinating within 22 days. The highest germination was obtained with 0·5/1000 but in no case were the values greater than in the controls and germination tended to decrease with increasing concentrations. Fungus development also showed a tendency to decrease with increasing concentrations.

232.318. Seed Testing. Germination Tests. Seed Quality

See also Nos. 3063, 3070.

3072. **Eleventh international seed testing convention, Paris, 4.6–9.6, 1956.** *Proceedings of the International Seed Testing Association, Copenhagen* 22 (1), 1957. pp. 578. [E.,F. or G.] L.S.

Papers, with discussion, relating to forestry include the following: Report of the forest seeds committee (*I. Gadd*; pp. 224–36) [presenting results of tests of purity and germination, according to new international seed-testing methods, carried out by 6 individual committee members on Swedish seed of *Picea abies* and *Pinus sylvestris*]. Report of the viability test committee (*H. Germ*; pp. 302–21) [presenting results of comparative germination and tetrazolium tests carried out by 10 individual committee members on *Carpinus betulus*, *Fraxinus excelsior*, *Pyrus communis*, *Prunus myrobalana*, *Rosa canina* and *Tilia grandifolia*]. X-ray diagnosis (*M. Simak*, *Å. Gustafsson* and *G. Granström*; pp. 330–42) [cf. *F.A.* 18 Nos. 349, 3958]. The change, caused by high temperature and determined by rapid techniques, in embryo properties of some Pines (*M. Krstić*; pp. 447–56) [presenting tabulated results of studies on the permeability to indigo-carmine, catalase activity, reducing power of the embryo tissues and development of the excised embryos on gelose, all in relation to seed germination % of seeds of *Pinus nigra*, *P. sylvestris*, *P. leucodermis* and *P. peuce* subjected to temperatures of 100–105° C. for 15–80 min. It is concluded that none of the 4 methods tested gives a completely reliable indication of the effect of high temperatures on germination for all the species tested]. [Cf. *F.A.* 20 Nos. 1566, 1713.]

3073. WALKENHORST, R. Hilfsgeräte zur Aufbereitung von Forstsaatgut und ihre Anwendung. **[Auxiliary equipment for the preparation of forest seed and its application.]** *Forstarchiv* 29 (12), 1958 (257–60). 10 refs. [G.]

Describes equipment of German make tested by the research unit, and in some cases in use in the State seed-preparation establishment at Wolfgang, including: the Trockenschrank RT and Brabender instruments for measuring the water content of seed, and others for electrical determinations of moisture content, the Fa. Fuess/Berlin-Steglitz anemometer for measuring air currents during seed extraction, and the Promi industrial vacuum cleanser for cleaning seed extraction plants.

3074. KONAR, R. N. **A quick method for germinating the seeds of *Pinus roxburghii* Sar.** *Sci. & Cult.* 24 (2), 1958 (89). E.M.B.

As a substitute for peat, a mixture of 3 parts of washed sawdust, soaked with *N* HCl and dried, plus one part of soil, was laid 1 in. deep, sown, covered with a similar layer and the light excluded. Watered on alternate days and kept at 30° C., 74% of the seed germinated after 10 days (usually 20–24).

3075. GUSTAFSSON, Å., and SIMAK, M. **Effect of X- and γ-rays on conifer seed [with an appendix on γ-irradiation of Pine and Poplar plants.]** *Medd. SkogsforsknInst., Stockh.* 48 (5), 1958. pp. 20 + 8 photos. [E.sw.]

(I) Pine seed from Lapland was subjected to X- and γ-irradiation (from a Co^{60} source) at dosages from 75 to 2400 R units. At dosages > 150–300 R both germinative capacity (germination % after 50 days) and rate (weighted average number of days before germination started) were diminished. The lower ripeness classes (by embryo sizes) lost germinative capacity faster than the higher ones. X-rays

had a slightly stronger effect than γ-rays. (II) Spruce seed from Gotland, of the highest ripeness class, conditioned to 2·8, 5·9 and 25·4% m.c. at 0, 40 and 100% r.h., was exposed to X-rays at dosages from 100 to 2400 R. Depressive effects on germinative capacity and rate, length of hypocotyl and dry weight of seedlings appeared at 100–600 R, with dry seed. Germination % of dry seed was 8 at 1200 R, and 0 at 2400, while that of the moist seed remained at 80% at 2400 R. Number of cotyledons was unaffected, and dry-matter content insignificantly increased, by irradiation. In neither (I) nor (II) were stimulating effects of low dosages observed. Both experiments used 2 replications of 50 seeds per dosage and class (ripeness or moisture). (III) In mutation experiments with 3-year-old grafted Scots Pine and rooted cuttings of *Populus* × *robusta*, *P.* × *serotina* and one other (Dutch) variety, Pines were killed outright by 4000 R and died within a year after 2000, whereas even 200,000 R had no immediate effects on the Poplars, viable cuttings being obtained after dosages up to 8000. Stem bases of highly irradiated plants were alive after 1 year, but no buds or branches developed after 50,000 R. The difference in sensitivity is attributed to differences in chromosome size. The literature on the effect of irradiation on seeds is discussed, particularly apparent discrepancies with the authors' earlier findings [cf. *F.A.* 15 No. 221].

3076. MAY, J. T., and POSEY, H. G. **The effect of [ionizing] radiation by cobalt-60 gamma rays on germination of Slash Pine seed.** *J. For.* 56 (11), 1958 (854–5). 2 refs.

Air-dried, unstratified seeds were exposed to γ-radiation of 500, 5000, 25,000 and 100,000 R units. The germination %s after 31 days were, for controls 94·8, and for the treated seeds 94·1, 88·2, 12·1, and 0·55% respectively. Irradiation dosages of 500 and 5000 R slowed down germination initially, but thereafter rates of germination paralleled those of controls.

232.32. Plant Rearing. Nursery Practice

See also Nos. 2904, 3031, 3034, 3067.

3077. VOCE, B. I vivai forestali. **[Forest nurseries.]** *Monti e Boschi* 9 (12), 1958 (648–58). [It.e.f.]

General notes on Italian nursery practice, with some figures for production of seedlings, acreage of nurseries etc., and photographs of installations for providing shade, irrigation etc.

3078. SANTOS, H. J. ABRANTES DOS. Resultados de algumas experiências efectuadas com várias espécies florestais nos viveiros do Nordeste. **[Results of experiments with various forest species in the nurseries of the Northeast.]** *Estud. Inform. Serv. flor. aqüic. Portugal* No. 97–C2, 1958. pp. 22 + 13 gphs., 2 dgms., 2 tbls. [Port.] Limited distribution.

Reports on the following: (1) the development of various species in the nursery during 1954–56; (2) data (weight and purity) on seed of *Cryptomeria japonica*, *Acacia melanoxylon*, *A. decurrens*, *Chamaecyparis lawsoniana*, *Cupressus lusitanica* and *C. macrocarpa*; (3) effects of immersion in hot water for ½, 1½, 3 and 5 min. on seed of 3 species of *Acacia*; (4) influence of spacing in planting out seedlings of *C. japonica*; (5) variations in specific gravity during air seasoning of 11 different species (including variations in different parts of the stem); and (6) characteristics of planting stock of 12 indigenous and exotic species grown in the nursery in 1957.

3079. PAVLENKO, F. A., and STAROVA, N. V. Vyraščivanie sejancev topolej na Ukraine. **[Growing Poplar seedlings in the Ukraine.]** *Lesn. Hoz.* 11 (4), 1958 (22–6). [Russ.]

Fresh, cleaned *Populus alba*, *P.* '*canadensis*' and *P. nigra* seed was sown in two nurseries in soil that had been (*a*) ploughed to 27 cm. and (*b*) ploughed to 35–40 cm. It was found that in most cases (*a*) gave better germination %, but height growth was approximately the same for (*a*) and (*b*). Damage from *Fusarium* was slightly less on (*b*). Sowing rates of 0·3, 0·6 and 1 g./m. of drill was used. All gave satisfactory germination %, and 1 g./m. is recommended. Beds covered with straw and twigs gave smaller, and usually fewer, seedlings than those left uncovered; where regular watering can be done, the use of coverings is to be avoided. The seed was covered with layers 2–3 mm. deep, of (1) shredded humus, and (2) sawdust; (2) resulted in low germination %, but (1) gave better results than uncovered controls. The authors recommend watering 3 times daily for the first 10 days, twice daily for the next 10, once daily for the third 10 days; watering to be stopped after 30–40 days.

3080. CHEN, C. W. **[Experiments on the relation of soils and covering depth to germination and growth of *Acacia mollissima*.]** *Bull. Taiwan For. Res. Inst.* No. 53, 1956. pp. 12. 4 refs. [Chin.]

A large-scale, statistically controlled experiment was carried out in the open, near Taipeh, in May 1949 with 64,000 flotation-tested seeds obtained from Australia in 1937 [no storage details] and sown on 64 separate plots, kept regularly watered and weeded. Variables were (*a*) 'mixed' sandy soil, (*b*) vegetable compost, (*c*) 'red' [loess?] soil, and (*d*) alluvial soil, with seed coverings 0·5, 1·0, 1·5 and 2·0 cm. thick. Germination was first recorded through the 0·5-cm. cover, after 6 days, on (*a*)–(*c*) soils, and had ceased on all plots within 30 days. It was best on (*a*) at 0·5 and 1 cm., next best on (*b*) at 0·5 and 1·5 cm., then on (*c*) at 0·5 and at 1 cm. and worst on (*d*), especially at 1·5 and 2·0 cm. The best height growth, taken in July and Dec. 1949, was on (*b*) (up to 202 cm.), the worst on (*a*).

232.321. Nursery Sites, including Factors affecting Selection of Sites for Nurseries

See No. 3117.

232.322. Preparation and Treatment of Soil, including Maintenance of Fertility

See also Nos. 2919, 2931–2, 3080, 3092, 3098–9, 3161, 3814–6.

3081. MORRISON, G. **Tractor assembly simplifies fumigation.** *Amer. Nurserym.* 108 (9), 1958 (7–8).

Describes, with illustrations, an assembly, developed by the Dow Chemical Co., which applies a MeBr fumigant to the soil and covers the treated strip with polythene sheeting, the edges of which are sealed simultaneously and continuously with a furrow of soil. The estimated cost of treatment is $500–600/acre, mainly for the materials.

3082. VAARTAJA, O. **A screening test for soil sterilizers.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (6), 1958 (2).

Nine chemicals (including allyl alcohol, Mylone 50, Vapam, H_2CN_2 (25%), formalin (37%), and granulated $CaCN_2$) were applied to a rich loamy soil infested with seeds of various broad-leaved annual weeds, at various rates and at different intervals (2, 7, and 14 days) before sowing with *Pinus banksiana* (results tabulated). Allyl alcohol and Vapam did not injure Pine even at rates considered excessive. There was little relationship between the time of application and injury to Pine, possibly owing to heavy rain immediately after sowing. All, except $CaCN_2$, gave good or fair weed control with little or no injury to Pine. Three other chemicals, Javex (10% dichloro dimethyl hydantoin), Pano-drench (0·6% cyano (methyl mercuri) guanidine), and urea, failed to reduce weeds materially at concentrations non-injurious to the Pine.

3083. THULIN, I. J., WILL, G. M., and BASSETT, C. **A pilot trial of soil sterilization in a forest nursery.** *N.Z. J. For.* 7 (5), 1958 (88–93).

A soil-sterilization trial with chloropicrin and formalin on a light-textured pumice soil resulted in a significant reduction in seedling mortality and an increase in growth. Plant analyses indicated an improvement in the availability of nutrients, particularly K. In this respect chloropicrin was the more effective. Species used in the trial were *Pinus radiata*, *P. nigra*, *Pseudotsuga taxifolia*, *Larix decidua* and *Picea sitchensis*. *Authors' summary.*

3084. **Forest nursery studies.** *Rep. For. Dep. W. Aust. 1957/58*, 1958 (27).

An estimate was made of the nutrients removed from the soil by a 1-year-old crop of *Pinus radiata*. The major inorganic nutrients removed (in lb./acre) were N 114, P 10, K 99, Ca 20, Mg 19. In another experiment, a number of surface-soil samples were taken from the old nursery beds and compared with adjacent virgin soil. Results are tabulated. The chief point of interest is the decline in organic matter, as measured by organic C and N, caused by regular cropping; organic C % was 3·01 for conifer and 2·67 for broadleaved beds against 5·93 for virgin soil; corresponding figures for N were 0·166, 0·197 and 0·317.

3085. **Forest fertilisers.** *Timberman* 59 (13), 1958 (29–36, 41–6). 13 refs.

This number includes 9 articles reviewing initial work on the use of fertilizers in the U.S.A. and British Columbia. Research projects, listed, cover studies on mature woods (20 in all), cone and seed production and seed orchards (16), general studies of species (19), plantation establishment, including Christmas trees and eroded soils (8), nurseries (5), nutrient uptake (3), and resin tapping (3).

Pulpwood companies are prominent sponsors of this research.

3086. POPOVA, N. S. Vyraščivanie sejancev v taežnoj zone s primeneniem udobrenij. **[Growing seedlings in the taiga zone with fertilizers.]** *Lesn. Hoz.* 11 (6), 1958 (33–5). [Russ.]

Reports results of fertilizer trials in nurseries on peaty soil (previously limed) with Pine and Siberian Larch using 9 different combinations of N, P, and K, and also AMB (bacterial fertilizer), given in a single application just before sowing. The best first-year results were obtained with 30/60/30 kg./ha. N/P/K; height growth was 50% and weight > 100% more than on unfertilized control plots. AMB alone had little or no effect, but in combination with the mineral fertilizers it further stimulated growth, especially in Larch. Another trial indicated that by sowing 50% more seed in drills 8 cm. wide than in drills 1 cm. wide, the yield of Spruce seedlings was increased by up to 220%. *Acer platanoides* did not respond favourably to this treatment.

3087. ŠČERBAKOV, A. P. Vlijanie mikroèlementov na rost i himičeskij sostav sejancev i saženców drevesnyh porod. **[The influence of trace elements on the growth and chemical composition of tree seedlings and transplants.]** In *Mikroèlementy v Sel'skom Hozjajstve i Medicine*, Akademija Nauk Latvijskoj SSR, Riga. 1956. pp. 443–54. 41 refs. [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (2), (No. 5906). [Russ.] H.S.B.

Data are given on Mn accumulation in the leaves of different species under different soil and climatic conditions. In general, Oak leaves had the highest Mn content. The effect of N, P and K fertilizers on Mn accumulation in leaves of Oak, Elm, Ash and *Caragana arborescens* seedlings is discussed. Small-scale field experiments on a heavy clay-loam showed that 3 g. H_3BO_3/2 sq. m. increased growth and content of organic matter in *Pinus sylvestris* seedlings, the effect being especially marked when no other fertilizer, or P only, was applied. Mn had a positive influence when no other fertilizer was applied. B influenced leaf and stem development most, Mn root development. Application of B and Mn to P-fertilized soil, increased the field germination capacity of Pine seed to 71–84%. The response in height growth of 4- to 5-year-old Birch, Oak and Spruce plants to Mn, Mo, B and Cu is also dealt with.

3088. SLUHAJ, S. I. O vlijanii marganca i bora na vshožest' semjan i rost molodyh drevesnyh rastenij. **[The influence of Mn and B on seed germination and seedling growth.]** In *Mikroèlementy v Sel'skom Hozjajstve i Medicine*, Akademija Nauk Latvijskoj SSR, Riga. 1956. pp. 455–63. [Russ.] From *abstr.* in *Referat Ž.* (*Biol.*) 1958 (2), (No. 5905). [Russ.] H.S.B.

When seeds with a low germination capacity, of *Caragana arborescens*, *Morus alba* and *Pinus sylvestris*, were pre-treated by soaking for 12 hours in 5–10 mg. $KMnO_4$/litre water, germinative capacity rose by 20–33% and germinative energy and seedling dry weight also increased. First-year seedlings of *Tilia platyphyllos*, *Quercus robur* and *Rhus*

cotinus in pots increased in height growth and content of organic matter after application of 25 mg. $Na_2B_4O_7$ per pot (holding 3 kg. soil). Height growth and organic-matter content were increased in *Fraxinus pennsylvanica* seedlings by a dose of 50 mg. $MnSO_4$.

3089. HRISTEVA, L. A., *et al.* Vlijanie guminovoj kisloty na rost sosny v pitomnikah i lesokulturah pri osennej posadke na Nižnedneprovskih peskah. **[The influence of humic acid on Scots Pine growth in nurseries and plantings in autumn on the Lower Dnieper sands.]** *Naučnye Zapiski Hersonskogo Sel'sko-Hozjajstvennogo Instituta* No. 6, 1957 (125–33). [Russ.] From *abstr.* in *Referat. Ž.* (*Biol.*) 1958 (2), (No. 5908). [Russ.] H.S.B.

In a nursery in the Kherson region, Scots Pine seedlings in beds given mineral N and P fertilizers were treated with 0·001% Na humate solution applied by watering in April and May. Treated seedlings showed improved growth and higher total ash contents. Treatment with the humate also increased the survival of seedlings planted by the 'peat-nest' method on sand dunes.

3090. RÖHRIG, E. Die Anzucht von Forstpflanzen in Nadelstreubeeten. **[The raising of forest plants in needle litter beds.]** *SchrReihe forstl. Fak. Univ. Göttingen* No. 22, 1958. pp. 49. 15 refs. [G.g.]

Confirms and amplifies the findings reported in *F.A.* 20 No. 426 on the basis of the same and additional experiments at Hann. Münden and at Kleve, Rheinland, and Birstein, Harz. A superiority of seedlings grown on needle litter (*a*), over seedlings grown on mineral soil (*b*), was also found for Douglas Fir, Scots Pine, Japanese Larch and *Thuja plicata*. This superiority was generally maintained not only in 2- or 3-year plants continuing on (*a*), but also on those transplanted to (*b*) after 1 year. In the case of Spruce, 1 + 0 stock did sometimes suffer a check in height growth, though not in dry-matter production, and in *Larix decidua* the check, attributed to weaker root development in (*a*), was so great as to make the method of doubtful use for this species. The N content of (*a*) seedlings was highest, that of (*b*) seedlings lowest, with that of transplants from (*a*) to (*b*) intermediate. The content of other nutrients varied. As growth results declined with the repeated use of the same litter, the loss of nutrients was investigated by lysimeter experiments, which indicated that leaching removed far more nutrients than did the growing plants. As even in a fortnight of drought only the top 3 cm. of litter dried out, the rest remaining fairly moist, careful watering, confined to the early stages of development, is recommended. Fertilizer experiments with combinations of P, Ca, K and N, or some of those, indicated that fertility could be restored and even improved. The use of a combined N, K, P fertilizer is recommended.

232.323. Sowing and Covering

See also Nos. 3074, 3080.

3091. DUMITRESCU, S. N. Despre producerea puieților de scoruș de munte (*Sorbus aucuparia*) in pepiniere. **[Raising *S. aucuparia* seedlings in the nursery.]** *Rev. Pădurilor* 1958 (8), (483–7). [Rum. russ.g.f.e.]

Best results were obtained from seed sown in Dec. immediately after collection and extraction from the fruit (18·65% germination). Seed stored at room temperature till spring, stratified, and sown in May gave 9·56%; seed stored in refrigerator and sown in May gave 12·38%. Seed should be sown in drills at a rate of 1·5 g./m., preferably when freshly collected.

3092. HÄGG, K.-E. Effektiviserad plantskoledrift. **[Rationalization of nursery management.]** *Skogen* 45 (23), 1958 (710–1). [Sw.]

Discusses the financial advantages (lower costs and increased production) from sowing 8 seed rows 20 cm. apart instead of 6 at 22 cm. per tractor width, and describes, with photographs, tractor-drawn equipment that can be used for cleaning between rows and for distributing fertilizers.

3093. NEUBACHER, F. Tannenwintersaat in der Waldarbeiterstube für die Keimlingsverschulung nach der Schneeschmelze. **[Sowing Silver Fir in winter in a forest workers' hut for transplanting after the thaw.]** *Allg. Forstztg.* 70 (1/2), 1959 (13–4). [G.]

To avoid deterioration of September-harvested seed of low germination capacity, the seed was sown in February in seed-boxes and old basins placed in a primitive but heatable wooden shelter. Heating was done only when the temperature inside fell below — 10° C. At outside temperatures of — 1° or over, the boxes were put in the open. The plants developed well, but sowing in January is recommended, so as to allow terminal buds to develop before transplanting.

232.324. Transplanting and Lining Out, including Grading of Seedlings

3094. **New planter increases production in nursery.** *Amer. Nurserym.* 108 (9), 1958 (11).

The planter, designed at the Wood Howell Nurseries, Bristol, Va., is steered by a small front roller, while a larger hollow cylinder towards the rear, with lugs resembling inverted flower pots on its surface, makes 8 rows of evenly spaced holes. A crew of 4 planters, riding on a bench at the rear of the machine, each planting 2 rows, can together plant 22,000 plants per 10-hr. day.

3095. KAISER, F. Über halbmechanisches Verschulen im Rahmen neuzeitlicher Kampbewirtschaftung. **[Semi-mechanized transplanting in modern nursery practice.]** *Forst u. Jagd* 8 (7), 1958 (332–3). [G.g.]

Productivity per worker is shown to increase 2 and 2½ times respectively when transplanting of 1- to 2-year conifers and 2-year broadleaved species by hand labour alone, is replaced by semi-mechanized work in which trenching is done with an improved horse-drawn implement (described). Details are given of performance, cost and depreciation, and savings in time and money.

232.325. Tending (in both Seedbeds and Transplant Beds)

See also Nos. 3082, 3092, 3305 *et seq.*

3096. WETTSTEIN-WESTERSHEIM, W. Kunststoff-Folien im Forstgarten. [**The use of plastic sheets in forest nurseries.**] *Holz-Kurier, Wien* 14 (5), 1959 (7–8). [G.]

Reports on successful small-scale trials with black polythene sheets, having 2-cm. slits every 4 cm., laid on seedbeds of Common Alder, Spruce and Pine. Seedlings, particularly Alder, were much taller than controls at the end of the growing season, and weeds negligible. Water supply was not impeded. Covering the soil between rows of transplanted Aspen ca. 1 m. high, with black polythene, also eliminated all weeding.

232.327. Protection Measures in Nurseries

See also Nos. 3081–3, 3326–7, 3329.

3097. **The use of venetian blind slats for covering nursery frames.** *Silv. Note For. Res. Inst. N.Z. For. Serv.* No. 1, [1958]. pp. 3.

Aluminium slats, fixed with convex side uppermost, made satisfactory covers for nursery beds (methods of fixing described). Germination was a little slower than under hessian, but there was no difference by the end of the growing season. The durability of the slats is their great advantage, but they also allow better air circulation and are easier to handle than hessian.

3098. MEIJNEKE, C. A. R. **Soil exhaustion in tree nurseries.** *Span, Shell Public Health and Agricultural News, London* 1 (4), 1959 (2–5). 7 refs.

Describes tests with D-D mixture to kill nematodes (particularly *Pratylenchus penetrans*) in nursery soil. Good results have been achieved on sandy and sandy clay soils.

3099. MILLER, P. M. **Fumigation when transplanting nursery stock.** *Plant Dis. Reptr.* 42 (10), 1958 (1178). A.P.B.

No toxicity to plants was observed when the nematocide 1,2-dibromo-3-chloropropane was used to fumigate the soil during or soon after planting Apple, Peach, Pear, Plum, *Taxus cuspidata*, *Quercus alba*, *Q. borealis*, *Cornus florida*, *Pinus strobus*, *Acer rubrum*, and *Viburnum dentatum.*

232.328. Vegetative Propagation

See also Nos. 2793, 2795, 2829.

3100. NIENSTAEDT, H., *et al.* **Vegetative propagation in forest genetics research and practice.** *J. For.* 56 (11), 1958 (826–39). 181 refs.

Reviews world literature, and concludes that future research must concentrate on the physiological processes involved in graft union and incompatibility, and in root initiation. Fundamental aspects of water relations, nutrition, and the role of hormones must be investigated, and the relationship between age and rooting elucidated.

3101. WELLS, J. S. **Efficient media for plant propagation.** *Amer. Nurserym.* 108 (9), 1958 (14, 92–4).

Media successfully used include perlite for Koster Blue Spruce, and a sphagnum/sand mixture for *Chamaecyparis obtusa nana gracilis* under a mist spray.

3102. ENRIGHT, L. J. **Response of *Metasequoia* cuttings to growth-regulator treatments.** *Bot. Gaz.* 120 (1), 1958 (53–4). 3 refs. O.B.D.

Hardwood cuttings of *M. glyptostroboides* were treated with solutions of α-naphthalene-acetic acid, 2,4,5-T, indolebutyric acid plus thiram (commercial), and indolebutyric acid alone. The last named was the most satisfactory, consistently stimulating heavy rooting. *From author's summary.*

3103. WANG, C. P., and CH'EN, H.-C. [**A brief account of experimental propagation by cuttings of some important trees and shrubs in Chungsan Memorial Botanical Garden, Nanking.**] *For. Sci., Peking* 1958 (3), (292–307). 10 refs. [Chin.chin.e.]

Results are discussed and tabulated, with photographs of rooted cuttings, for 10 species, each reared under a range of conditions, of which the best were: *Laurus nobilis*—shaded frame, river sand and heeled cuttings, treated with NAA (50 p.p.m. for 24 hr.); *Torreya grandis*—green cuttings, similar IAA treatment; *Aleurites fordii*—green cuttings taken in autumn, in frames at controlled humidity; *Eucommia ulmoides*—shaded frame, river sand, green cuttings, NAA treatment as *L. nobilis*; *Ginkgo biloba*—in boxes in the open, green cuttings (and woody cuttings if stratified first); *Distylium racemosum*—open nursery bed with garden soil, or a shaded bed with sandy loam, cuttings in both of 2-year shoots; *Metasequoia glyptostroboides*—open nursery bed, woody cuttings, after stratification, green cuttings in boxes, in river sand, NAA treatment as *L. nobilis*; *Prunus yedoensis*—woody cuttings, after stratification; *Prunus lauro-cerasus*—sandy loam, green or half-woody cuttings; *Magnolia liliflora*—green cuttings, either in open nursery bed with sandy loam, or in frame, with rivers and, NAA treatment as *L. nobilis.*

3104. IZUKA, T. [**The response of cuttings, more particularly their rooting, to the method of growth-regulator application.**] *Trans. 66th Mtg. Jap. For. Soc.* 1956 (88–9). [Jap.]

A preliminary report, using 20-cm. cuttings from 2-year-old shoots of (1) a 3-year-old, (2) a 25-year-old *Populus davidiana*, and keeping one group of each (*a*) in water, changed weekly, (*b*) in river sand and water, the latter changed every 3 days, (*c*) in a cellar at ca. 20° C. and 70–80% relative humidity, under a 200-watt lamp during daylight hours. All groups were pretreated with IAA, both in lanolin (0·5%) and by 24 hours' submersion in water solution (0·01%), either at the base or the tip of the cutting. Results are tabulated. Treatment at the tip in most cases stimulated rooting best but inhibited shoot growth and the two were, in general, inversely proportional. Cuttings from (1) taken from lower down on the parent tree proved much more vigorous than those from higher up.

3105. KUCHLENZ, F. Untersuchungen über die günstigste Wurzelstecklingslänge und -stärke bei der vegetativen Vermehrung von Pappeln der Section

Leuce durch Wurzelstecklinge. [**Study on the optimum length and thickness of root cuttings in vegetative propagation of Poplars of the section *Leuce*.**] *Züchter* 28 (7), 1958 (336–43). 6 refs. [G.g.] E.M.B.

Various methods of propagating Poplar are described. These include the use of unlignified shoots developing on root cuttings and a further development [cf. *F.A.* 19 No. 4123], in which, when such cuttings are planted out in the following spring, their roots are trimmed, and sections, 10–12 cm. long, of the excised roots are used as root cuttings. Similar cuttings can be made from roots of the progeny of crosses within the section *Leuce*, after the seedlings have been assessed for some years for desirable characteristics. A spacing of 1 × 1 m., and light, sandy soil are recommended to encourage free root growth. For large-scale clonal experiments, 2- to 3-year plants are cut down in the spring to encourage the formation of root suckers, which will by autumn be sufficiently large to transplant. In experiments at Waldsieversdorf in 1956, root cuttings from progeny of the following crosses were made: (1) *P. alba* × *P. alba*, *P. canescens* × *P. canescens*, *P. canescens* × *P. alba*; (2) *P. tremula* × *P. tremula*; (3) *P. tremula* × *P. canescens*; (4) *P. tremula* × *P. tremuloides*. Root cuttings were (*a*) 10–12 cm. long, subdivided into 5 thickness classes ranging from < 0·10 cm. to 1·0–1·70 cm., and (*b*) 4 cm. long, in 4 thickness classes ranging from 0·1–0·29 to 1·0–1·70 cm.; (*a*) were planted vertically and (*b*) horizontally. The mean rooting %s for all lengths and thicknesses were respectively 34·3, 44·9, 41.9 and 61·0% for hybrid groups (1)–(4) above. A study of the effect of size of cuttings on rooting of *P. tremula* and *P. canescens* showed that, for the former, only cuttings 10–12 cm. long, but of any thickness in the range tested, should be used, whereas for the latter, cuttings 4 cm. long and ⩽ 0·5 cm. thick, or 10–12 cm. long and ⩽ 0·3 cm. thick, can be used. No results showing the effect of cutting size for *P. alba* and the interspecific crosses are given.

3106. FLOOR, J., WEZELENBURG, P. A., and DOESBURG, H. H. VAN. Proeven met vermeerdering van houtige gewassen. [**Experiments in propagating woody plants.**] *Mededelingen, Instituut voor de Veredeling van Tuinbouwgewassen, Wageningen* No. 82, 1956. pp. 20. 9 refs. [Du.e.*e*.] E.M.B.

Many forest species were successfully propagated by layering, notably Birches (mostly pendulous varieties), and several street and ornamental trees, notably *Prunus subhirtella autumnalis*.

3107. CHOUINARD, L., and PARROT, L. **The callusing and rooting of air-layers in *Betula papyrifera*, *Populus tremuloides*, *Larix laricina* and *Abies balsamea*.** *Contr. Fonds Rech. for. Univ. Laval* No. 2, 1958. pp. 16. 8 refs. [E.f.]

Air-layering, without the use of growth-stimulating substances, was carried out in June on 45 branches of *B. papyrifera*, 46 of *P. tremuloides*, 56 of *L. laricina*, and 54 of *A. balsamea*, the layers being covered with moist sphagnum moss and polythene bags. Examination after 4 months showed that a more or less voluminous collar of wound callus, depending on the species, had formed at the base of all air-layers, whether rooted or not. Only 8 air-layers of *B. papyrifera*, 4 of *P. tremuloides*, 4 of *L. laricina* and none of *A. balsamea* had produced roots. The anatomy of the callus tissue is described in detail.

3108. **Vegetative propagation [of Wattle].** *Rep. Wattle Res. Inst. S. Afr. 1957/58*, 1958 (21–2).

The lower branches, which have hitherto been mainly used for air-layering, are quickly shaded out, while the placing of air-layers on the thin outer ends of upper branches has proved to be almost impossible. In an attempt to overcome these difficulties, different placing of the air-layers was tried on several trees in the nursery. Thick branches, sufficiently long to reach up to and form part of the crown, and therefore not subject to shading, were chosen. The air-layer was placed at the lower end of the branch at a point ca. 1 ft. from the main stem, so that working conditions were relatively easy using a ladder and a safety belt. Some of the branches were > 15 ft. long and > 2½ in. in diam. at the point of layering. Branches, which rooted freely, were sawn off ca. 1 ft. above and immediately below the air-layers, and the rooted sections transferred to pots, where they are growing satisfactorily. Most of the layers were made at 30–40 ft. from the ground, and the success of these (nearly 80% rooted) has dispelled any fears that the rooting potential of high branches is not as good as that of low branches. Experiments in propagation of Wattle by grafting or budding have failed.

3109. POSPÍŠIL, J. O afinitě mezi osikou *P. tremula* L. a některými dalšími jedinci rodu *Populus*. [**On the affinity between *Populus tremula* and some other representatives of the genus *Populus*.**] *Sborn. čsl. Akad. zeměd.* (*Lesn.*) 4 (11), 1958 (1005–16). 10 refs. [Cz.cz.russ.e.]

Reports grafting trials using 2-year *P. tremula* stocks, and scions from adult trees of the sections *Leuce* (8 different species and hybrids), *Aigeiros* (5 species), *Tacamahaca* (2 species), and from the intersection hybrid *P.* × *berolinensis*. Grafts with *P.* × *eugenei* and *P. candicans* did not take, but all the others were successful in varying degrees.

3110. GANČEV. P. Vărhu otzivčivostta na njakoi vidove topoli kăm prisaždane. [**The reaction of some Poplar species to grafting.**] *Izv. Inst. Gorata bălg. Akad. Nauk, Sofia* No. 2, 1957 (121–42). 15 refs. [Bulg.bulg.russ.g.]

In experiments with *P. przewalskii*, *P. nigra* var. *italica*, *P. deltoides* and *P. tremula*, cuttings 16–18 cm. long were grafted with scions 5–8 cm. long in early March and planted in pots in a greenhouse. Both cuttings and scions were taken direct from 1-year shoots in the stool bed. *P. przewalskii* proved the most suitable stock as it rooted quickly and the % of rooting was high; *P. n.* var. *italica* and *P. deltoides* were successfully grafted on to it. Use of the two latter as the stock for *P. przewalskii* scions gave a low % take. Both rooting and graft union were unsatisfactory in grafts between *P. n.* var *italica* and *P. przewalskii*.

3111. HANSEN, E. Forsøk og prøver med kvistpoding ved NLH. [**Grafting experiments at**

Norges Landbrukshøgskole.] *Gartneryrket, Oslo* 46 (16), 1956 (309–10). [Nor.] E.M.B.

Spliced grafts of *Ulmus glabra exoniensis* on *U. glabra* were successful at all dates from 25 March to 8 June; height growth reached by 8 Oct. decreased for grafts made after bud break (early May). Spliced Lilac grafts were less affected by date but rind grafts were less successful after bud break.

232.329. Miscellaneous (including Greenhouses, Frames, Raising in Pots, Tubes etc.)

See also Nos. 3116, 3142.

3112. Piccione, R. Caratteristiche tecniche ed economiche delle coltivazioni vivaistiche in 'Fitocelle'. **[Technical and economic aspects of the use of 'Fitocelle' to raise planting stock in the nursery.]** *Repr.* from *Tecnica Agricola, Catania* 9, 1957. pp. 20. [It.]

[Cf. *F.A.* 18 No. 4024; 19 No. 4132.] Gives details of costs, use etc. of the two types of Fitocella (one re-usable and one expendable). The containers can be used for raising planting stock from seed, for transplanting, or simply for transporting ball stock to the planting site. The re-usable type has a drawstring for use during transport. The patent belongs to Lazzara & Co., Catania.

3113. Soulères, G. Élevage de plants forestiers en mottes. **[Raising forest planting stock in compressed-earth pots.]** *Rev. for. franç.* 10 (12), 1958 (807–16). [F.]

Describes, with a number of photographs, the technique employed in Morocco for raising Eucalypt and Acacia seedlings in earthen pots in which they are eventually planted out without removal. The pots are made of compressed compost, consisting of 2 parts by volume of well decomposed humus from *Argania* stands, 1 part arable soil with as small a content of clay as possible, and 1 part chopped straw. The humus is disinfected a month before use with 2% formaldehyde and the completed compost treated with a fungicide (Karathene WD or Dithane). The pots are cut out of the compressed compost with a hand tool, and filled with fresh compost on which the seeds are sown, watered and protected by low shade. The seedlings, complete with pot, are planted out in the field at 5–6 months, after cutting back to 3–4 leaves and root-pruning flush with the pot. Costs are rather higher than for plants raised in earthenware pots, but survival and growth are much superior.

232.33. Formation of Stands by Direct Sowing

See also Nos. 3116, 3131, 3369.

3114. Prochnau, A. E. **Factors affecting the reproduction of conifers in the Spruce/Alpine-Fir types.** *For. Res. Rev. B.C. For. Serv 1957/58*, 1958 (13–4).

An experiment has been carried out on direct (spot) sowing of *Picea glauca*, *Abies lasiocarpa*, *Pseudotsuga taxifolia* and *Pinus contorta* under (*a*) natural stand conditions, (*b*) cut to a 12-in. diam. limit, and (*c*) clear-cut plus slash burn, on 4 site types and 4 types of seedbed. Ca. 1500 seed-spots were sown and results observed for 5 years. Among general conclusions are the following: (1) All species failed under all stand conditions, on an undisturbed seedbed. (2) Any disturbed or scarified seedbed generally resulted in the successful establishment of all species sown. (3) All species on all sites needed protection against rodents. (4) No benefit resulted from covering seed with ¼ inch of soil.

3115. Little, S., Cranmer, C. B., and Somes, H. A. **Direct seeding of Pitch Pine in Southern New Jersey. A progress report.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 111, 1958. pp. 14.

Results of tests in 1955–57 showed that, with favourable weather, adequate regeneration may be obtained by sowing in January–February, treating seedbeds (as below) and covering lightly with soil or debris. Broadcasting was at a rate of 5 lb./acre, but 1–2 lb. may suffice. In 1957, when the growing season had less than half the normal rainfall, only seed sown on seed-spots (12 per spot) and protected by wire-gauze cones germinated successfully. Prescribed burning was a necessary preliminary on sites with heavy litter, followed by disking or (rather more effective) brush hogging [undergrowth cutting] after sowing. Where the litter is less dense, combined brush-hogging and disking may replace burning.

232.4. Formation of Stands by Planting

See also Nos. 2904, 3031.

232.41. Planting Stock (Type, Handling and Treatment)

3116. Weeraratna, W. G. **Studies on artificial propagation of the more important timber trees of Ceylon.** *Ceylon For. (n.s.)* 3 (3/4), 1958 (293–314).

Summarizes research carried out in the experimental garden trials (1937–57) on the artificial regeneration of Nedun (*Pericopsis mooniana*). These indicate that basket plants have given consistently better results (both survival % and mean height at closure) than the other methods (ordinary nursery stock, direct sowing at stake, and stumped plants). Stumps were least successful.

3117. Macharáček, M. Některé další možnosti k zlepšení umělé obnovy lesa. **[Further possibilities of improving artificial regeneration.]** *Sborn. čsl. Akad. zeměd. (Lesn.)* 4 (10), 1958 (907–14). 6 refs. [Cz.cz.russ.g.]

Quotes figures from the author's investigations showing that loss of roots in lifting transplants amounts to 50% of the fine roots and 40% of those 0·25–0·75 mm. thick, and that even with hole planting 90% of the roots get injured or deformed. Describes a new method of direct sowing on prepared round beds 2·5–3·5 m. in diam., in which groups of plants (e.g. Pine), spaced 20–30 cm., are left and the rest planted out, preferably as ball plants, on the surrounding site. [Cf. *F.A.* 16 Nos. 2903–4.]

3118. Mullin, R. E. **An experiment with wrapping materials for bales of nursery stock.** *Res. Rep. Ont. Dep. Lds. For.* No. 37, 1958. pp. 31. 16 refs.

The materials compared were sacking, sacking lined with waxed paper, and blue polythene sheeting,

used to wrap 2 + 2 White Spruce baled in bales of 600 plants and stored in an open shed near Pakesley, Ontario, for 10–40 days before planting. Mortality in general increased with length of storage and the experiment failed to show any significant difference in survival of the stock due to the wrapping materials.

232.42. Methods of Planting (including Use of Fertilizers etc.)

See also Nos. 2932, 3046–7, 3085, 3089, 3094, 3128.

3119. MESHECHOK, B. Et forsøk med bruk av fullgjødsel ved plantning av furu (*Pinus silvestris* L.) på myr. Foreløpig rapport. [**A study on the use of compound fertilizer on a bog planted with *P. sylvestris*. Preliminary report.**] *Medd. norske Skogforsøksv.* 15 (3), No. 51, 1958 (275–304). 8 refs. [Nor.e.*e.*]

The experiment was laid out in 1954 in an area of *Sphagnum* bog with old drainage ditches dug 20 years earlier and a new ditch dug in 1954, parallel with and 15 m. from the old one. Two of the experimental blocks were between the ditches and two were on the far side of the new one; another ditch parallel with the first two was dug beyond these blocks and parallel with older ditches in 1955. Soil and vegetation of the area are described in detail. The compound fertilizer contained 11·5% N, 5% P and 17·5% K, and was spread evenly over the area at 0, 20, 40 and 60 kg./dekare. Planting, on upturned turves, on mounds with the top sliced off or on bare soil, according to the variations in the ground surface, was carried out with 2 + 0 Pine in June 1954; half the plants were planted with and half without the addition of mineral soil round the roots. Survival, shoot length and height were assessed in 1954, 1955 and 1957. Results, given in graphs and tables, show that (1) plant quality was better at the first two inspections in the blocks lying between the two ditches than on those with a ditch on one side only, and the difference in height growth was still apparent, after further drainage, in 1957; (2) survival was low on the plots without fertilizer, 20 kg./dekare was too low to produce healthy plants with good height growth, and 60 kg. gave the best results; (3) adding mineral soil to the roots increased survival and height growth but the effect decreased with increasing amounts of fertilizer.

3120. MESHECHOK, B. Om plantemetoder for *Pinus contorta* var. *latifolia* Engelm. på myr. Foreløpig rapport. [**Planting methods for *P. contorta* var. *latifolia* on bogs. Preliminary report.**] *Medd. norske Skogforsøksv.* 15 (3), No. 51, 1958 (305–24). 6 refs. [Nor.e.*e.*]

Presents the results (% survival, height and leader length) after 3 years (1955–57) of planting by 4 methods: (1)–(3) flat-root planting, the roots after the plants were in position being covered with ⅛ bucket of peat from the bottom of drainage ditches, with, in (1) planting on an inverted sod replaced in the hole from which it was dug, in (2) planting on an inverted sod placed on the planting spot and pressed well down, (3) planting directly on the moss layer; and (4) T-notch planting. Crude phosphate was added to the planting spots at the rate of 50 g. per plant. Data on the vegetation, precipitation, and chemical soil analysis of the area, a soligenous bog at Prestebakke, Østfold, are given. Method (1) gave the best results; (2) and (3) showed similar height growth but survival from (3) was low, as a result of the drought of 1955; (4) gave the poorest growth but better survival than (3). Phosphate proved an adequate fertilizer. Many of the plants formed an additional whorl of branches during summer and this appeared to be related to planting method, % values of plants with such a whorl being 31·9, 34·9, 26·9 and 13·4% for methods (1)–(4) respectively.

3121. REISSINGER, G. Vereinfachte Pflanzverfahren. [**Simplified planting methods.**] *Forstarchiv* 29 (10), 1958 (238–40). [G.]

Compares briefly methods and costs of hole planting, slant planting and angle planting [cf. *F.A.* 19 No. 4143].

3122. STRENN, L. Billiger und besser aufforsten mit der Reissingerschen Winkelpflanzung. [**Cheaper and better afforestation with Reissinger's angle planting.**] *Allg. Forstztg.* 70 (1/2), 1959 (7–8). [G.]

An illustrated description of the method, said to have proved at least as successful as more expensive methods in tests in Lower Austria. It is claimed that contact with the undisturbed soil improves the water supply and that the method prevents frost-heaving. [Cf. *F.A.* 19 No. 4143.]

3123. JEDLOWSKI, D. Temperatura tla pod kamenim pločama. [**Soil temperature under stone slabs.**] *Šumarstvo* 11 (3/4), 1958 (161–72). 13 refs. [Serb.e.f.*e.*]

Tabulates data on soil temperatures under stone slabs at 2, 5, 10 and 20 cm., measured at 3 times of day in July–Aug. 1956 at Split on the Dalmatian coast. Stone slabs are often used for protection round young plants in the Karst region [cf. *F.A.* 20 No. 1765].

3124. ČERNYŠEV, V. V. Lesoposadočnaja mašina SLN-2. [**The SLN-2 tree planter.**] *Lesn. Hoz.* 11 (4), 1958 (63–5). [Russ.]

Gives specifications of, and performance figures for a 2-row, hand-fed planter for 1- or 2-year plants. It can be front- or rear-mounted on DT-57 and DT-54 tractors.

232.43. Spacing and Arrangement in Plantations

3125. NYLINDER, P. Synpunkter på produktionens kvalitet. I–III. [**Aspects of quality production. I-III.**] *Skogen* 45 (4; 23), 1958 (100–2; 714, 717–8); 46 (3), 1959 (54–7). 10 refs. [Sw.e.]

Presents in graphs and tables the results of a study on the variation in branch thickness and knot content in Pine and Spruce at different spacings. Differences in branch thickness between spacings were greatest towards the butt and smallest towards the top. Within spacings, branch diameter increased with stem diameter, and a correlation was found between branch diameter and ring width. The knot content increased with increasing height in the tree (differences being greater in Pine than in Spruce) and increasing stem diameter and spacing.

Basic density (oven-dry weight/max. vol.) decreased with increasing height in the tree, increasing diameter, increasing annual ring width, decreasing latewood %, and increasing latitude and altitude; it was generally 6–12% higher in Pine than in Spruce of the same diameter. Figures are tabulated for Pine (Tiveden, Västergötland) and Spruce (Omberg, Östergötland) at different spacings, for dry weight per mean tree, per sq. m. b.a. and per cu.m., and for b.a., volume and weight of dry substance (all per ha.). Little difference was found in the amount of dry matter produced in trees at spacings up to 2 × 2 m.

3126. RUSSELL, T. E. **Spacing—its role in the growth of planted Slash Pine.** *Sth. Lumberm.* 197 (2465), 1958 (115–7).

Analyses 14-year-old plots in S.W. Louisiana established at 2500, 1600, 1150 and 250 trees/acre (ca. 4-, 5-, 6- and 13-ft. square spacing). When the planting rate falls much below 1150/acre, total volume production is reduced during the early life of a stand and initial thinning must be delayed. The greater earlier returns from thinning the 2500- and 1600-tree plots compared with the 1150-tree plot, would not, however, have balanced increased planting costs. The commonly used spacing of 6 × 8 ft. (908 trees/acre) is considered a good compromise.

232.44. Season and Time of Planting

3127. HUSS, E. Om höstplantering av tall och gran. **[Autumn planting of Pine and Spruce.]** *Medd. SkogsforsknInst., Stockh.* 48 (3), 1958. pp. 55. 19 refs. [SW.e.e.]

[Cf. *F.A.* 20 No. 464.] A fuller account. Planting in September or October gave similar survival to spring planting. August plantings were poor.

233. Afforestation

See also Nos. 2724–5, 2961, 2973, 3021, 3046, 3050, 3334.

3128. ŞTEFĂNESCU, P. Cîteva observaţii privind lucrările de împadurire în terenuri înmlăştinabile din raza Ocolului silvic Tg.-Mureş. **[Methods of afforesting marshy land in the Tg.-Mureş forest district.]** *Rev. Pădurilor* 1958(7), (396–401). 6 refs. [Rum.russ.g.f.e.]

Successful plantations have been made on soils with a high water table of stagnant groundwater, by planting on ridges made either by digging or by ridge-ploughing with a mouldboard plough. Some data are given on survival and growth of *Quercus robur*, *Q. sessiliflora*, *Q. borealis*, *Fraxinus excelsior*, *Acer pseudoplatanus*, *A. platanoides* and *Ulmus carpinifolia*. The different forms of ridging are illustrated in diagrams.

3129. MAMAEV, S. A. Opyt proektirovanija zaščitnyh lesonasaždenij na beregah Kujbyševskogo vodohranilišča. **[A suggested plan for protective forest stands on the banks of the Kuibyshev reservoir.]** *Izvestija Timirjazevskoj Sel'skohozjajstvennoj Akademii, Moskva* No. 2, 1958 (175–84). 2 refs. [Russ.e.] O.R.E.

Analyses the problems that may occur when large reservoirs are created—silting, bank landslides and erosion, and flooding—with particular reference to the Kuibyshev Reservoir (5000 sq. km.). Forest establishment is essential to prevent such damage, and 8 different kinds of protective forest are described for various parts of the catchment area, the river valleys, and the actual banks of the reservoir. The purposes of each of these types in the whole integrated scheme, the methods of establishing them, and the best tree and shrub species to use, are discussed.

3130. KNABE, W. Beiträge zur Bibliographie über Wiederurbarmaching von Bergbauflächen. **[Contributions to a bibliography of rehabilitation of mining waste lands. Part 1.]** *Repr. from Wissenschaftliche Zeitschrift der Humboldt-Universität zu Berlin (Mathematisch-Naturwissenschaftliche Reihe)* 7 (2), 1957/1958 (292–304). 206 refs. [G.g.]

Covers chiefly Germany (131 titles) but also Czechoslovakia (9), other European states and the U.S.S.R. (3), U.S.A. (44) and U.K. (16) very selectively, dealing with the restoration of coal-mining spoil mounds, opencast-mined land, gravel pits, etc. to agricultural or forestry uses.

3131. ROOSEN, H. Probleme und Möglichkeiten bei der Aufforstung von Halden und anderen Aufschüttungen im Ruhrgebiet. **[Problems and possibilities in afforesting slag-heaps and other tips in the Ruhr.]** *Forst- u. Holzw.* 14 (1), 1959 (4–10). 4 refs. [G.]

Discusses various types and shapes of tip, the magnitude of the problem in the Ruhr (individual tips of 70 ha. and > 60 m. high), afforestation techniques, and suitable species (including *Ailanthus altissima*). A method of direct sowing of Oak on tips is described: balls of loam and peat are made (about the size of a snowball) and 2–4 acorns pressed into each. The balls are placed out in rows across the tip slope, and give the young seedlings a good start.

3132. PIOTROWSKI, F. W sprawie doboru drzew i krzewów do zadrezewień i zalesień ochronnych w falistych terenach lessowych. **[Considerations on the choice of tree and shrub species for reforestation and shelterbelts on undulating loess terrain.]** *Sylwan* 102 (12), 1958 (23–41). 3 refs. [Pol.russ.e.]

Large areas of deforested and eroded, undulating loess land in central and S. Poland present a serious problem. The difficulties and requirements in reforesting such areas are discussed. The establishment of multi-storeyed, mixed stands with a shrub layer is recommended, using species such as Oak, Lime, Willow, Poplar and Bird Cherry. Pine, Larch and Birch can be planted as nurse species on the poorer sites.

3133. DUGELAY, A. Une belle réalisation: les reboisements du Faron. **[A fine achievement: the afforestation of Mont Faron.]** *Rev. for. franç.* 11 (1), 1959 (19–40). [F.]

An historical account of the afforestation (begun ca. 1860) of what was then a bare, rocky mountain

overlooking Toulon harbour, and of the subsequent vicissitudes of the forest so created.

3134. VIGNAU, M., VIGNAU, L., and PRIOTON, S. Réflexions sur l'emploi du sapin pectiné dans les reboisements du Causse Noir et du Larzac. **[The use of Silver Fir in afforestation work on the Causse Noir and the Causse du Larzac [Aude].]** *Rev. for. franç.* 11 (2), 1959 (89–103 + 1 plate). 6 refs. [F.]

Discusses observations made in small stands, now 20–30 years old, mostly introduced under Pine, at 650–850 m. alt. on the calcareous plateaux of the region. Though growth has generally been slow, it is thought to be satisfactory on Bajocian siliceous soils, where the trees were healthy and the length of terminal shoots was increasing. On Bathonian dolomitic soil, results were often poor. Its use in further trials, mainly by underplanting, is recommended.

3135. HORVAT, A. Nekoliko misli i orijentacionih podataka o primjeni dračе (*Paliurus aculeatus* Lamp.) pri pošumljavanju Krša. **[Some thoughts and preliminary data on the use of *P. aculeatus* in Karst afforestation.]** *Šum. List.* 82 (11/12), 1958 (391–7). 20 refs. [Croat.f.]

Notes on its possible use as a pioneer species, and results of germination from nursery sowings.

3136. ERKER, R. Hundert Jahre Karstaufforstung in Slowenien. **[A hundred years of Karst afforestation in Slovenia.]** *Cbl. ges. Forstw.* 75 (3/5), 1958 (268–80). 4 refs. [G.]

Traces the administrative history, the contributions of various foresters etc., and includes a description of recent work and future plans covering afforestation proper, conversion (underplanting of *Pinus nigra* with Silver Fir and other species), tending and protection of existing stands, afforestation techniques, pests etc. *Pinus nigra* is still the most important species except for certain coastal districts more suitable for *P. halepensis*.

3137. TRACI, C. Cultura aninului verde (*Alnus viridis* (Chaix) Lam. et D.C.) pe terenurile degradate de la altitudine mare. **[The use of *A. viridis* on degraded soils at high altitudes.]** *Rev. Pădurilor* 1958 (10), (606–8). 6 refs. [Rum.russ.g.f. e.]

Gives results of some experiments in planting *A. viridis* at altitudes of 1370–1440 m., on slopes of 28–30°, on thin and eroded soils. Among the advantages of this species are its resistance to drought and frost, its modest soil requirements, and its ease of reproduction (by seed, suckering, or layering.

3138. CHANG, H.-C. and SHANG, S. **[Experience in tree planting to conserve soil moisture on Mt. Tachuan, Yangkao district, Shansi province.]** *For. Sci., Peking* 1956 (2), (99–108). [Chin.]

An account, in some detail, of the work accomplished over an area of ca. 155 acres, including terracing, ditching etc., and fruit- as well as timber-tree planting; as a result, cultivation lower down benefited by increased water supplies.

3139. KAO, S.-W. **[Soil improvements by tree planting in the eroded middle reaches of the Yellow River.]** *For. Sci., Peking* 1956 (2), (86–98). 7 refs. [Chin.]

Makes recommendations in some detail (including suitable shrubs) for reclaiming the various types of eroded land. The references are all Russian.

3140. JOSHI, N. J. **The Cutch desert immobilization scheme.** *Indian For.* 85 (1), 1959 (43–50).

Covers the problem, details of the scheme, work done, and results to date. Afforestation is the principal method of arresting desert spread.

3141. KHAN, M. I.-u.-R. **Some afforestation problems and research needs in relation to erosion control in arid and semi-arid parts of West Pakistan.** *Pakistan J. For.* 8 (1), 1958 (112–9 + 6 photos, 1 gph., 4 tbls., 2 maps). 15 refs.

A paper submitted to the International Symposium on Soil Erosion and its Control in Arid and Semi-arid Zones, held at Karachi in Nov. 1957, including a brief account of afforestation and sand-dune stabilization methods in the past decade.

3142. MAHEUT, J., and DOMMERGUES, Y. La fixation par le reboisement des dunes de la presqu'île du Cap-Vert et l'évolution biologique des sols. **[Sand-dune fixation by afforestation on the Cape Verde peninsula, and the biological development of the soil.]** *Bois For. Trop.* No. 63, 1959 (3–16). 6 refs. [F.e.span.]

Describes successful afforestation with *Casuarina equisetifolia*, including topography, climate, soils etc. of the site, nursery techniques (polythene tubes, particularly a recently tested type 35 × 5 cm. that produces vigorous, long-rooted stock), spacing, irrigation, protection against blowing sand and grazing animals etc. Height at 9 years was 13–14 m. in places, d.b.h. 35 cm., and the distance protected ca. 10 times the height of the trees. Biological activity in the soil was greatly increased, but comparative laboratory experiments with a similar, though more developed, soil from the interior, which was enriched with *C. equisetifolia* or *Cassia* [*siamea*] litter, indicated a lack of bacteria in the N cycle, and no mineralization of N took place in the Casuarina sample. It is suggested that in the second generation Casuarina should be replaced by, or mixed with, other species, possibly *Cassia*.

3143. SHIPMAN, R. D. **Planting Pine in the Carolina Sandhills.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 96, 1958. pp. 43. 20 refs.

A paper based on published and unpublished research and experience on many experimental sites, dealing chiefly with the establishment of *Pinus palustris*, the original Pine of the area, thought to be best in the long run, despite better survival and early growth of *P. elliottii*, *P. taeda* and other species, e.g. *Juniperus virginiana*. Seed source, nursery treatment, site preparation, planting and early tending are discussed. Prescriptions are given for the spacing of seedlings of various grades for various soils and soil preparation to produce a given plant %. Chief recommendations are to plant (by machine for preference) 1 + 0 high-grade

seedlings root-pruned and with foliage clipped, in winter, on scrub Oak sites after complete clearing or furrowing and on old fields after furrowing, plus chemical control of competing vegetation.

3144. RYKER, R. A. **Conifers vs. hardwoods on old-field sites.** *Sta. Note Cent. St. For. Exp. Sta.* No. 122, 1958. pp. 2.

After 11 years, findings corroborate earlier results [cf. *F.A.* 13 No. 2970]. The most successful softwood species, in order, are: Loblolly Pine, Shortleaf Pine, White Pine. Height growth of the Pines and Eastern Red Cedar was similar on the slightly eroded and severely eroded sites.

3145. SISCHO, P. C. **Tree planting in Southern California.** Division of Forestry, Department of Natural Resources, Sacramento, Calif. 1958. pp. 28.

Preliminary results of state and private experiments in the afforestation of waste land (mostly covered with dwarf scrub) in California, on the basis of which recommendations are made as to site preparation, species, planting stock etc.

234. Formation of Forest by Natural Succession

3146. ZOLOTOV, R. N. Estestvennoe zarastanie klenom sovremennyh razmyvov. **[Revegetation of eroded gullies by natural seeding from Maple [in adjacent plantations].]** *Lesn. Hoz.* 11 (6), 1958 (78–9). [Russ.]

Acer negundo established itself much more abundantly than *Fraxinus* (3 species), *Ulmus* sp., *Elaeagnus angustifolia* and *Robinia pseudoacacia* on the steep eroded slopes of several gullies (some 1500 m. long and up to 10 m. deep) in Stalingrad region.

235. Underplanting, Advance Planting etc. Nurses and Formation of Mixtures. Interplanting of Inferior Growth

See also Nos. 3049–50, 3114, 3135.

3147. LEIBUNDGUT, H., and KREUTZER, K. Untersuchungen über die Wurzelkonkurrenz. 1. Mitteilung über den Vorwald. **[Investigations on root competition. 1. Advance plantings of nurse species.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 34 (5), 1958 (361–98 + 3 photos). 6 refs. [G.f.it.e.]

An investigation is in progress on the effect of nurse species on microclimate near the ground, soil, and the growth of the main crop species, in mountain afforestation. Preliminary experiments showed that root competition of *Alnus incana* seedlings did, but watering with its root extract did not, adversely affect the height of Spruce seedlings. In a series of pot trials with *A. incana*, *Betula pubescens* and *Populus tremula* significant reduction in growth of Spruce and Scots Pine was first apparent in the second growth season. Alder reduced mean height growth more than Birch, and Aspen not at all, possibly because it had developed poorly. In open-air trials with the same nurse species, 1-year-old seedlings of Spruce or Pine or Oak were planted in single rows between single rows of 1-year-old nurses spaced 1·2 m. apart, in such a manner that alternate groups of each test plant were shielded from root competition of nurse species by metal barriers placed along the inner side of each nurse row. No significant differences in competition for light were found as between nurses or as between test species. Total competition was significantly greater for Pine with Alder than for Pine with Aspen, and for Oak with Birch than for Oak with Aspen. Root competition (measured as the difference in height growth between the shielded and the exposed groups) was more important than light competition, and was greatest in Birch and least in Aspen. Spruce was most affected by it, and Oak least.

3148. COSTIN, E. Efectul stimulator al aninului negru (*Alnus glutinosa* Gaertn.) asupra creşterii speciilor lemnoase pe nisipurile fluvio-maritime. **[The stimulating effect of *A. glutinosa* on the growth of woody species on fluvio-maritime sands.]** *Rev. Pădurilor* 1958 (10), (573–7). 12 refs. [Rum. russ.g.f.e.]

A study was made of a number of plantations, 12–17 years old, on the sands of the Danube delta, in which Black Alder grows pure or in mixture with hybrid Black Poplars (*Populus* × *regenerata*, *P.* × *marilandica* and *P.* × *serotina*), White Poplar (*P. alba*) and *Acer negundo*, and also pure stands of these species. It is concluded that the stimulating effect of the Alder on the growth of other species growing in mixture with it, is a function of soil conditions, whilst the response to it varies from species to species. On pure sands or sandy soils poor in humus and deficient in N, the ameliorating effect of Alder on the soils is considerable and growth of other species is increased—hybrid Black Poplars as much as sixfold, White Poplar much less. When grown in mixture, hybrid Black Poplars outgrew Alder even on sites where only the latter could grow at first (e.g. depressions with hydrophilous vegetation), and in intimate mixtures always became dominant, the Alder being eventually reduced to the status of an auxiliary species. In such conditions, in addition to its function as a soil improver, the Alder encourages natural pruning in the Poplars.

236. Care of Regeneration or Plantations in the Initial Stages of Establishment

See also Nos. 3305 *et seq.*, 3606.

3149. KITAEV, I. G. Prisposoblenie k kul'tivatoru dlja obrabotki počvy v rjadah posadok. **[A special attachment to a cultivator for inter-row tillage.]** *Lesn. Hoz.* 10 (4), 1957 (53–6). [Russ.]

The implement was developed at the Millerovo MTS for inter-row weeding in young plantations and shelterbelts where the trees are > 8 mm. in diam. at or near ground level. It is fitted to a conventional tractor- or horse-drawn cultivator, and consists essentially of two sets of almost horizontal cruciform blades of spring steel, 60 × 6 mm. in cross section, rotating by ground friction. These blades sever weeds at or near ground level, and a safety spring device is fitted so that if a blade strikes a sapling > 8 mm. in diam. it rotates back 90°, thus passing the plant without damaging it.

3150. KITAEV, I. G. Prisposoblenie k kul'tivatoru. [**A special attachment to a cultivator.**] *Lesn. Hoz.* 11 (5), 1958 (55–6). [Russ.]

Presents specifications, engineering drawings and technical description of the attachment [cf. preceding abstract].

3151. POPOV, JU. N. O sniženii zatrat ručnogo truda na uhodah za molodymi nasaždenijami. [**Lowering the cost of hand labour in tending young stands.**] *Lesn. Hoz.* 11 (4), 1958 (53–4). 1 ref. [Russ.]

Investigations with the KLT-4, 5 B steered hoe have shown that damage to young trees in forest strips and shelterbelts increases with the working speed, speeds > 7 km./hr. being particularly harmful. This holds good for any setting of the hoe blades (i.e. for any distance between the hoe blades and the line of young trees). To remedy this, and to make it possible to work closer to the line of trees, a curved metal shield (illustrated) $3 \times 100 \times 800$ mm., was welded to two special arms on the upright of each A-blade. The shields protect the trees from the blades, and the steersman has better control of the implement. It is possible to work the blades as close as 10 cm. on either side of a line of trees. Working at 3–4 km./hr., with a blade setting of 20 cm. (both sides) from the trees, only 0·07% of the trees were severed by the hoe blades.

3152. SAHAUTDINOVA, O. A. Prisposoblenie k kul'tivatoru KLT-4,5 B. [**An attachment to the KLT-4-5 B cultivator.**] *Lesn. Hoz.* 11 (6), 1958 (57–8). [Russ.]

Assuming that inter-row weed control would be more effective than by ordinary hoeing if the weeds were buried under a layer of earth, the Bashkir Agricultural Research Institute constructed a suitable implement by fitting mouldboards to the uprights of cultivator blades. When tested in shelterbelts and plantations on heavy chernozem soils, this implement completely buried weeds > 10 cm. high, and rates of work of 12 ha. in 8 hr. were achieved. It can work to within 17–20 cm. of the lines of young trees, and is claimed to be a highly practical and effective tool.

3153. [**Mulching for control of grass in plantations.**] *Rep. Dep. Agric. Seychelles 1957*, [1958] (11).

The mulching begun in 1956 was extended to most areas, and the beneficial effect on young plantations on poor soil was so striking that it is probable that wherever material can be obtained within a reasonable distance, mulching rather than hoeing will be the preferred method of controlling *Panicum parvifolium* which, unless checked by one means or another, will choke young trees in a few months. Though it often grows up through the mulch, it is then easily and cheaply cut with a bush knife and, being unable to take fresh root on top of the mulch, adds to the useful layer of organic matter.

237. Amelioration of Forest Sites

See also Nos. 2700, 2758–9, 2962, 3085, 3153, 3183, 3304.

3154. HEIKURAINEN, L. Lettoräme ja sen metsäojituskelpoisuus. [**Eutrophic Pine bogs and their suitability for draining.**] *Silva fenn.* 93 (2), 1957 (1958). pp. 29. 22 refs. [Fi.e.*e.*]

On the basis of ground vegetation and nutrient contents, these bogs are divided into two sub-types: (*a*) eutrophic Pine bogs proper, and (*b*) eutrophic Pine bogs with ericaceous sub-shrubs. The vegetation on both types and its variation with microtopography are described in detail. Since the drainability classification of bogs is made with reference to the effect of drainage on tree growth, measurements were made on circular sample plots, (1) drained 20 years ago and (2) undrained, on each type in a number of areas. Comparison of the results indicates that bogs of type (*a*) belong to drainability class I, while those of type (*b*), though better than class VI, are inferior to class III. For practical purposes it is therefore necessary to divide the eutrophic Pine bogs into two sub-types as suggested above.

3155. KUPČINOV, N. N. Vlijanie glubiny i kačestva torfa na rost sosny na osušennyh bolotah. [**The influence of peat depth and quality on the growth of Scots Pine on drained bogs.**] *Doklady Akademii Nauk Belorusskoj SSR, Minsk* 1 (2), 1957 (76–9). 7 refs. [Russ.] N.L.L.

Investigations were made from 1950 to 1953 on the growth of 50- to 65-year Scots Pine on raised and transitional bogs that had been drained some 45 years earlier. Two main types of rooting were distinguished: (1) the root system completely contained within the peat layer; (2) the roots reaching the mineral soil, after the bog had been drained, through a peat layer only 0·3–0·5 m. deep. In (1) only the nutrient content of the peat, not its depth, influenced tree growth. On sphagnum bogs, however, tree growth depended on the depth of the sphagnum layer, decreasing with increasing depth of the layer. With layers $>$ 50–70 cm. deep, drainage had been virtually useless. In (2), drainage usually gave positive results. Tree growth depended on the depth and nutrient status of the peat layer, and on the nutrients in the underlying mineral soil.

3156. THURMANN-MOE, P. Noen foreløbige retningslinjer for anlegg av gjødselfelt på næringsfattig myr med henblikk på skogsreising. [**Preliminary recommendations for applying fertilizers on wet peat soils, poor in nutrients, in order to grow trees.**] *Norsk Skogbr.* 5 (1), 1959 (11–3). [Nor.]

Discusses (1) the choice of areas most worth fertilizing in relation to climate, accessibility, soil type, existing tree growth and lapse of time since drainage; (2) spacing (15–30 m. apart, according to latitude, altitude, rainfall etc.) and depth (80–130 cm.) of ditches; (3) composition of the fertilizer and the number of applications, varying with the site type and time since drainage; (4) treatment of the crop on the areas fertilized (thinning, cleaning, planting *vs.* natural regeneration etc.); (5) methods of planting; and (6) the lay-out of the ditches. Includes a list of 9 site types in order of priority for fertilizer application; they range from already drained types, with usable tree growth or regeneration, to sphagnum bogs.

3157. ALMEIDA, C. R. MARQUES DE, and MORAIS, A. DE MATOS. Nota prévia sobre um método para o emprego das substâncias fertilizantes nas culturas arbóreo-arbustivas das regiões tropicais. **[Preliminary note on a method of using fertilizers in the cultivation of trees and shrubs in tropical regions.]** *C.R. 6ième Sess. Conf. int. Afr. Ouest* Vol. 3, 1956 (39–43). [Port.span.f.e.]

In view of the difficulties involved in fertilizing tropical soils, a method has been devised of applying fertilizers to the soil in the shape of large granules (naphthalene-ball type) by means of holes bored in the region of the root system. This facilitates penetration of the active elements into the soil, leaving the roots undamaged.

3158. JACKSON, L. W. R., and CLOUD, M. C. **Nitrogen fertilizer increases growth of stem of Slash, Longleaf Pine.** *Naval Stores Rev.* 68 (9), 1958 (4–5). 10 refs.

A study was made of the effects of surface-applied N on radial growth of Slash and Shortleaf Pine. In early March NH_4NO_3 was applied to experimental plots at rates of (1) 50 lb./acre and (2) 200 lb. In Slash Pine, at the end of the growing season, total net seasonal growth increased over the control by 27% for (1) and 13% for (2). In Shortleaf Pine (1) failed to produce a significant increase in radial growth. At the end of the growing season, (2) produced a net growth increase of 26% over the control. Radial growth ended earlier in Shortleaf Pine than in Slash Pine.

3159. JUNG, J. Rohhumusmelioration mit Harnstoff. **[Amelioration of raw humus with urea.]** *Allg. Forstzeitschr.* 13 (51), 1958 (764–5). 6 refs. [G.g.]

In laboratory tests with various raw-humus soils, urea reacted chemically with the raw humus in the same manner as free NH_3, whereas nitrates and other N fertilizers did not. The amount of bound N produced was correspondingly higher, and that of leachable N lower than with these. Amounts of 225–450 kg. urea/ha., according to the thickness of the raw-humus layer, are recommended for practical amelioration treatments.

3160. DUCHAUFOUR, P., and GUINAUDEAU, J. Une expérience de chaulage sur humus brut. **[An experiment in liming on raw humus.]** *Ann. Éc. Eaux For. Nancy* 15 (2), 1957 [1958], (335–64). 19 refs. [F.f.]

Five treatments were tested on replicated plots on a wet *lande* in Gascony that had been strip-sown with *Pinus pinaster* 3 years previously. The treatments were (*a*) 4 tons of [slaked?] lime/ha., (*b*) 4 tons $CaCO_3$/ha., both dug in, (*c*) 4 tons $CaCO_3$ ha. spread on the surface, (*d*) 8 tons $CaCO_3$/ha. dug in, and (*e*) dug but not limed. Soil samples were taken at 3-monthly intervals and analysed for C, N, pH, and exchangeable Ca and N. The conclusions drawn from the results are: (1) Complete activation of the raw humus would necessitate very heavy liming bringing the pH to neutrality, and this would be harmful to the Pine seedlings. It is therefore necessary to calculate the dosage giving a pH of ca. 5·5. This maximum effect is reached ca. 6 months after treatment, and the humus then tends to acidify again, so that maintenance treatments are necessary. (2) Surface treatment gave very variable results and may be harmful to Pine seedlings. Digging had of itself a beneficial effect and may be sufficient to activate humus where the initial pH is $> 4{\cdot}5$. (3) Moderate liming produced only a slight mineralization of the unavailable N and P stored in the raw humus, and liming should therefore be supplemented by an application of N and P (e.g. a mixture of basic slag and non-acidifying NH_3).

3161. Bemesting en grondbewerking. **[The use of fertilizers and soil cultivation.]** *Korte Meded. Bosbouwproefsta., Wageningen* No. 34, 1958 (9–11). [Du.]

Various fertilizers (compost, basic slag, and lime marl, singly or in combination) were applied in 1950 to a 25-year stand of Japanese Larch that, as a result of drought in 1947, was suffering from a growth disturbance and a drop in mean annual ring breadth from 2·5 to 0·9 mm. The Larch showed no increase in ring breadth after the application, but native Oak grown in mixture with it, which had suffered no set-back from the drought, showed increased ring breadth for all fertilizer applications. Young Larch plantations at Ruinen, Hooghalen and Hardenberg all reacted strongly to phosphate, the optimum being 400 kg. P_2O_5/ha. Application of a mineral N fertilizer to Spruce was effective only when there was adequate moisture in the ground and rainfall immediately after application; the effect lasted 2 years. Application of S at 2250 kg./ha. reduced the pH of old nursery soils from 6·4 to 4·5; growth of Larch and Corsican Pine increased with increasing rate of application; the pH of drought-susceptible old asparagus fields was little influenced by S.

3162. LENGER, A., and BOURDEAU, P. F. Action des phosphates Thomas sur la croissance de l'épicéa dans le jeune âge. **[The effect of basic slag on the growth of young Spruce (*Picea abies*).]** *Bull. Soc. for. Belg.* 66 (1), 1959 (9–18). 5 refs. [F.]

Applications of basic slag ($\frac{1}{8}$ kg./plant) spread on the surface round the trees, had no effect, during 4 years after application, on a 2-year-old plantation established on the site of a clear-felled Beech stand, and a positive, but very small, effect on a 4-year-old stand established after clearing and burning the site of a Spruce plantation felled 10 years previously. It is suggested that the same or slightly heavier applications in the planting holes at the time of planting, might be more effective.

3163. BERGAN, J. Et gjødslingsforsøk i en yngre granplantning i Troms. **[An experiment with fertilizer in a young Norway Spruce plantation in Troms.]** *Medd. norske Skogforsøksv.* 15 (3), No. 51, 1958 (251–73). 7 refs. [Nor.nor.e.e.]

The experiment was started in 1951 in a 1937 plantation of 2 + 2 Spruce, by applying $Ca(NO_3)_2$ (N content 15·5%), superphosphate (7·4–8·3%) and K (40% K_2O), alone or in combination, at 0, 15 and 30 kg. (K and N) or 0, 25 and 50 kg. (P) per 1000 sq. m. Tables and graphs show the increased height increment resulting, the effect lasting 5–7 years.

It was greatest with N for all heights of tree; reaction to P and K was greater in small than in large trees. There was a tendency towards increased frost damage with increasing amounts of fertilizer. One combination of N and K appeared to reduce height growth. The results were extremely variable, and it seems probable that an experimental design with more replications and fewer variables would be more satisfactory.

24. Tending of Stands and Trees

See also Nos. 3197, 3335.

242. Thinning

See also Nos. 3178, 3276, 3545, 3579, 3743.

3164. MÄCHLER, H. Die Arbeitstechnik in der Durchforstung. [**Working techniques in thinning.**] *Allg. Forstztg* 69 (23/24), 1958 (299–303). [G.]

Discusses, chiefly on the basis of the literature, size of gang, equipment, etc., and reports on the author's own time studies, which indicate that for mid-diameters of 8–17 cm. two-man gangs took ca. 32% more man-hours per cu.m. felled than single workers. One-man work is recommended up to 20 cm. d.b.h., with 2-man felling and 1 man barking and cross-cutting for diameters > 20 cm.

3165. MORRISS, D. J. **Basal area thinning guides for thinning in the South [U.S.A.].** *J. For.* 56 (12), 1958 (903–5). 3 refs.

Because of the wide variations in soil and natural stocking density that occur towards the end of a rotation, systems of determining and checking densities left after thinnings should be based on site and age. An accurate yet simple method is to thin so as to leave a b.a. that is a definite % (e.g. 57 or 64%) of the normal b.a. for a given site and age. The advantages of the method are discussed.

3166. DEKANIĆ, I. Njegovanje šuma kao mjera za unapređenje šumske produkcije. [**Forest tending as a means of improving forest production.**] *Šum. List* 82 (10), 1958 (339–48). 10 refs. [Croat.croat.e.]

A review of French, German, English and Jugoslav literature on the influence of tending on (*a*) volume increment and (*b*) wood quality. In two stands of mixed hardwoods of the same site class, ca. 70 years old, in the Sava plain, *Fraxinus angustifolia* that had been favoured in thinnings [no year given] had a mean diam. of 37 cm., while that of *Quercus robur* was only 21·1 cm.; where, however, *Q. robur* had been favoured, it had a mean d.b.h. of 27·8 cm. against 31 cm. for *F. angustifolia*. The effect of tending on rotation length is briefly discussed. A guide is given for the improvement of species composition of lowland and upland stands by thinning.

3167. RADULOVIĆ, S. Ogledi nege u šumama zapadnog Srema. [**Tending operations in forests of W. Srem [Serbia].**] *Šumarstvo* 11 (5/6), 1958 (278–94). 10 refs. [Serb.serb.e.f.]

Describes thinnings made in 1956 on two sample plots of 1 ha. each in (*a*) a 33-year and (*b*) a 55-year Oak (*Q. robur*) stand growing in mixture with *Fraxinus angustifolia*, *Ulmus campestris*, *Populus alba* and other hardwoods. Thinnings reduced the total stand volume of (*a*) from 92·98 to 75·28 cu.m., removing primarily *P. alba* stems from the overstorey as well as Elm and Maple of poor crown form, and trees in a state of dieback; and of (*b*) from 172·50 to 155·88 cu.m., removing mostly Oak of poor form as well as some *P. alba* and unhealthy trees from all layers. Site conditions and the history of the forests of the district are described.

3168. DAY, M. W. **Thinning Aspen in Upper Michigan.** *Quart. Bull. Mich. agric. Exp. Sta.* 41 (2), 1958 (311–20).

Discusses 10-year results of thinning in 1947 in a 28-year-old stand of *Populus tremuloides*, *P. balsamifera*, *Abies balsamea* and *Picea glauca*, thinned (*a*) from below to leave 300, or (*b*) 200, crop trees per acre, and (*c*) from above, removing 10–12 cords/acre, or (*d*) clear felling. Mortality on all plots during this period from defoliation by *Malacosoma disstria* and from the canker *Hypoxylon pruinatum* was high, particularly in Balsam Poplar. The (*b*) treatment is recommended, as it gave good growth and encouraged the development of Spruce and Fir in the understorey. Thinning to a residual spacing of 8 × 8 ft. increased b.a. increment in a 20-year stand; thinning to 7 × 8 ft. in a 10-year-old stand greatly reduced mortality from *M. disstria* as compared with the controls.

243. Opening of the Canopy (Increment Fellings, Overhead Release and Improvement Fellings)

See also Nos. 2991, 3311 *et seq.*

3169. SMALLEY, G. W. **Stand improvement pays off.** *Sth. Lumberm.* 197 (2465), 1958 (100–2).

Describes a study in a typical depleted Pine/hardwood forest in N. Alabama removing (*a*) merchantable hardwoods ⩾ 6 in. d.b.h. only, (*b*) removing or girdling all hardwoods ⩾ 6 in., or (*c*) removing or girdling all hardwoods ⩾ 2 in. Ten years later, Pine volume of pulpwood size had increased from 2·7 to 5·6 cords on (*a*), from 3 to 6·8 on (*b*), and from 1·8 to 7·1 on (*c*), but only from 2·2 to 3·2 cords on an untended control. The most intensive treatment was also the most economic.

3170. **Brady tree girdler.** *For. Equipm. Note, FAO* No. *E.*15.58, 1958. pp. 2.

[Cf. *F.A.* 19 No. 4198.] With photographs and specification.

3171. MINCKLER, L. S. **Bottomland hardwoods respond to cutting.** *Tech. Pap. Cent. St. For. Exp. Sta.* No. 154, 1958. pp. 10. 1 ref.

Data are given on growth, mortality and reproduction in mixed stands of *Acer saccharinum*, *Populus deltoides*, *Fraxinus pennsylvanica* and other hardwoods on the Mississippi flood-plain, S.W. Illinois, 3 years after treatment by: (*a*) clear felling, (*b*) heavy improvement and harvest fellings, (*c*) light improvement felling combined with girdling or poisoning cull trees, and (*d*) no treatment. Basal-area growth was highest and mortality least on (*b*) (where b.a. after felling was 44·9 sq. ft./acre) and mortality was highest on (*d*). Poisoning was more effective than girdling in removing cull trees, as

many girdled trees coppiced vigorously. Reproduction was chiefly of Ash and Silver Maple.

3172. IRVING, F. D. **Killing cull Black Oaks [*Quercus velutina*] with ammate, 2,4,5-T and mechanical girdling.** *Minn. For. Note* No. 71, 1958. pp. 2.

Girdling should be used only when regrowth is desired or is not objectionable. No regrowth was observed on trees treated with Ammate (in notches) or 2,4,5-T (basal sprays). Where many trees of all sizes are concerned, a summer basal spray with 2,4,5-T is probably the most practical method.

3173. SLUDER, E. R. **Control of cull trees and weed species in hardwood stands.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 95, 1958. pp. 13. 20 refs.

Reports results, after 3 years, from tests of various methods—chemical, mechanical, or both—in the S. Appalachians. In the < 5-in. class, 2,4,5-T in oil was the most effective, as a basal spray on Red Maple (1) and Laurel (2) and as a stump treatment on Hickory (3) and Rhododendron (4), and with Ammate on Oaks (5) and Sourwood [*Oxydendrum*] (6). In the 5- to 11·9-in. class, 2, 4,5-T in frills was best for (3), and Ammate in cups for (5) and (6). Nothing was effective against (1) which, with (4), proved the most difficult to control. For still larger trees of (3) and (5) single girdling was satisfactory, but (3) tended to heal over machine-made girdles. *From author's summary.*

3174. Bosverbeteringsproef Mapane (kamp 8). **[Mapane stand improvement trial (area 8).]** *Jversl. Landsbosbeh., Paramaribo* 1957 (50, 53, 56). [Du.]

Trials were started in 1956 on 50 plots, of 1 ha. each, as follows: (*a*) all unwanted species > 5 cm. d.b.h. were treated by surface spraying of the bark with a 5% solution of 2,4,5-T butyl ester in one operation; (*b*) as (*a*), but treating all unwanted trees > 10 cm. d.b.h.; (*c*) as (*a*), but all trees > 40 cm. treated in the first and the rest in the second year; (*d*) the same, but in 3 years, in the order > 40 cm., 20–40 cm., 5–20 cm.; (*e*) untreated control. The third stage in (*d*) will not be carried out, because opening the canopy by selective killing took place more rapidly and intensively than had been expected. On (*a*), but not on (*b*), *Scleria* and climbing plants are beginning to come in. It is concluded that treatment (*a*) is too drastic for forests of this type, where the number of trees of merchantable species is too small to permit crown closure soon enough to prevent the entry of unwanted species. In July and August, 1500 marked trees were girthed on treated and control plots; results given in graphs show that *Tetragastris altissima* and Basralocus [*Dicorynia guianensis*] reacted strongly, and Wanapisie [*Ocotea* sp.] little, to canopy opening.

3175. PICKLES, A. **Methods employed in West Africa for the destruction of redundant forest trees.** *Emp. For. Rev.* 37 (4), 1958 (421–8).

Reviews recent work in Nigeria, Ghana, Sierra Leone and the Belgian Congo, and discusses the relative merits of applications of Na arsenite, 2,4,5-T and 2,4-D.

245. Tending of Trees, Pruning etc.

See also No. 3479.

3176. PUDDEN, H. H. C. **Seasons of pruning for Cypress [*C. lusitanica*].** *Tech. Note For. Dep. Kenya* No. 50, 1957. pp. 1.

Because of the delayed occlusion following dry-weather pruning, the latter was restricted to May–June. This note now alters and extends the allowed periods for anticipating the inception of regular rains and making use of substantial falls of unexpected rain.

3177. PUDDEN, H. H. C. **Pruning [of *Cupressus* spp.].** *Rep. For. Dep. Kenya 1955/1957*, 1958 (18–9).

Investigation of possible techniques designed to present a minimum of wound area to the hazard of egg-laying by *Oemida gahani* continued. The principle of frequent high pruning is accepted as effective in reducing the size of branch pruned and therefore in reducing the *Oemida* target [cf. *F.A.* 20 No. 3479]. The height of pruning, i.e. proportion of pruned stem to total height, cannot exceed two-thirds without serious loss of diameter increment. Height loss is not severe at this fraction. An experiment was made to determine the effect on occlusion rates of pruning with (*a*) pruning saw, (*b*) anvil-type secateurs, and (*c*) scissor-type secateurs, and the results were significantly in favour of (*a*). There was no significant difference between occlusion rates with (*b*) and (*c*), but (*c*) are unsuitable as they rapidly become unserviceable. The experiment confirmed previous findings that the occlusion rate for small-diameter wounds is significantly faster than that for larger wounds, and that there are significant differences in occlusion rate between individual trees. In an attempt to speed up an investigation into the possible effect of season of pruning upon occlusion rate, artificial wounds were made with a cork-borer on the pruned section of Cypress stems. This technique had the advantage of eliminating variance due to size of wound, length of stub and eccentricity of shape. Measurements, made at frequent intervals, revealed a correlation between rate of healing and soil m.c. Variation in apparent rate of occlusion was found to be confined to the immediate post-wounding period. When wounding was followed by dry weather, wounds increased in size and the cambium died back under the bark at the perimeter of the wound. When wounding was followed by wet weather, occlusion started at once and no cambial dieback occurred. As a result, the permissible seasons of Cypress pruning were extended to cover all periods of high soil m.c.

3178. PUDDEN, H. H. C. **Pruning and early thinning of *Pinus radiata* and *P. patula*.** *Tech. Note For. Dep. Kenya* No. 51, 1957. pp. 3.

Instructions include: pruning to remove whorls to half height plus one whorl above (ca. $\frac{5}{9}$ of total height); beginning when the mean height of dominants is 18 ft. and continuing every second year until this height is 54 ft. (maximum pruning height 30 ft.); control of height by gauge (illustrated) and table (given); selection [for retention] by the Queensland method [*F.A.* 17 No. 3937] to be done

before the second pruning, the latter to include unselected stems if it saves labour in the first thinning and does not reduce the wind-firmness of the stand. Stems/acre for *P. radiata* at ages 5, 7, and 9 should be 350, 300, and 250 and at 12, 15, 20, 25 years, 200, 150, 125, and 100, subject to priorities for removal (deadtops) and precautions (wind). A tentative schedule for *P. patula* of slightly greater density is included.

3179. DAVIS, G. **Profits from pruning Ponderosa Pine in relation to pruning diameter.** *J. For.* 56 (12), 1958 (905–8). 12 refs.

Explains a method for finding the most profitable size of trees to prune, based on the costs of pruning trees of various diameters and calculating these costs with interest to the date of maturity. Profit is computed by comparing the costs at maturity with the increased value realized as a result of the clear wood produced by trees of each diam. class.

3180. **Treating bark wounds by wrapping.** *Shade Tree* 31 (10), 1958 (7–8).

A successful experiment in treating injured bark has been made at the University of California, Los Angeles. The bark was completely stripped from the bole of a Chinese Elm from the ground upwards for a distance of ca. 4½ ft. Upon discovery some 28 hours after the injury occurred, the loosened bark was removed, the bole moistened with tap water, and the injured portion then wrapped with two layers of polyethylene film. The wrapping was not sealed along the edges, but tied with cord at the top, middle, and bottom. The injury occurred in June, and by the following October new bark had formed directly on the sapwood, and almost the whole wounded area was covered with this new bark. The new bark had developed, not through callus formation at the edge of the wound, but through continued activity of the cambium layer over the sapwood as a result of the protection provided by the polyethylene film. Some cases of similar wound healing have been reported when the injury was shaded either naturally or by burlap screens. It appears to be essential that shade or wrapping should be applied before the cambium layer is killed by the drying effect of exposure. [Cf. *F.A.* 19 No. 4209.]

3181. BUIS, R. Action de la lanoline et de l'acide α-naphthalène-acétique sur la cicatrisation chez *Acer pseudo-platanus* L. **[The effect of lanolin and α-naphthalene-acetic acid on cicatrization in *A. pseudoplatanus*.]** *C.R. Soc. Biol., Paris* 152 (5), 1958 (801–4). 3 refs. [F.] O.R.S.

Lanolin alone (*a*), or with α-naphthalene-acetic acid in concentrations of (*b*) 0·05%, (*c*) 0·5%, (*d*) 1% or (*e*) 2%, was applied to wounds (3 × 4 cm.) in the bark and cambium of trees, and the wounds were examined after 40 and 120 days. Percentages of the surface healed after 40 days were: (*a*) 22·18, (*b*) 20·24, (*c*) 26·61, (*d*) 46·88 and (*e*) 11·13. No appreciable increase in healing took place between 40 and 120 days, and in some cases the healed tissue died and the unhealed area increased during this period.

25. Treatment of Defective, Derelict or Very Open Stands

See also Nos. 2695, 3304.

3182. MAGYAR, P. Rontott erdeink helyreállitása különös tekintettel az Alföldi erdökre. **[Restoration of deteriorated forests in Hungary, particularly those of the Great Plain.]** *Erdészettud. Közl., Sopron* 1958 (1), (73–91). 11 refs. [Hu.hu. russ.e.g.]

Suggests treatment for various types of defect and soil, chiefly for stands of *Robinia pseudoacacia*. On sandy soils, underplanting with Austrian and/or Scots Pine, followed by the removal, after girdling, of part or all of the original stand, is recommended; in depressions, clear felling, stump removal, agricultural intercropping and replanting with e.g. Poplar and Alders, and on very compacted soils, replanting with Oak after similar treatment. *From author's summary.*

3183. MURAŠEV, N. V. Povyšenie produktivnosti lesnyh nasaždenij v Mogilevskoj oblasti. **[Raising yields from forest stands in the Mogilev region [Belorussia].]** *Lesn. Hoz.* 11 (5), 1958 (57–61). 1 ref. [Russ.]

Describes the programme of improvement started in 1955: afforestation of clearings with fast-growing commercial species, supplementary sowings and planting with similar valuable species in sparse or low-quality stands, drainage, and interplanting of perennial lupins. Results are encouraging.

26. Combinations of Forestry with Agriculture and Pastoral Husbandry. Irrigated and Floodland Forests. Shelterbelts etc., and their Treatment

261. Alternate Forestry and Agriculture, Periodic or Temporary Agricultural Use of Forest Land

See also No. 3200.

3184. LOETSCH, F. Der Einfluss des Brandrodungsbaus auf das Gefüge des Tropenwaldes und die Wasserführung der Ströme, untersucht am Beispiel Nordthailands. **[The effects of shifting cultivation on the structure of tropical forests and river behaviour, as studied in Northern Siam.]** *Repr.* from *Erdkunde, Bonn* 12 (3), 1958 (182–205). 26 refs. [G.g.e.]

Of the area of mixed deciduous monsoon forests and semi-evergreen broadleaved forests below 1000 m. alt., ca. 55% was found to be land under shifting cultivation, old clearings, or secondary forest without tall broad-crowned trees, after shifting cultivation. Analyses of the species composition of the closely intermingled parts of the forest containing or not containing Teak suggests that the Teak-free areas are also secondary forests following shifting cultivation in the distant past, Teak being, by nature of its dispersal etc., the last species to reoccupy a site. Of the areas above 1000 m. alt., ca. 41% were under shifting cultivation or old clearings, and part of the tree savannas, covering ca. 25%, are also probably a result of the practice, which is increasing under the pressure of population. While erosion is not yet widespread or serious, a marked increase of flood peaks in the chief rivers can be noted in the last 25 years. [Cf. *F.A.* 20 No. 1292.]

262. Fuel and Fodder Forests

See also No. 3035.

3185. GUPTA, J. N. S. **Fuelwood plantations in India. An information paper prepared for the Asia-Pacific Forestry Commission.** *For. Occ. Pap., FAO* No. 5, 1958. pp. 73 + 6 photos.

Includes chapters on fuelwood requirements, past plantation activities and their results by regions, farm forestry (including afforestation of waste lands by village unions), natural and artificial regeneration, protection and legislation, yields, costs, and returns, and notes regarding the soil requirements, raising, tending, yield etc. of 13 species.

263. Irrigated Forests. Forests subjected to Flooding or Seepage (*Auewald*)

See No. 3035.

264. Farm Forests

3186. MCWHANNELL, F. B. ***Eucalyptus* trees for New Zealand farms.** *N.Z. J. Agric.* 96 (4), 1958 (329 . . . 339). O.R.E.

Discusses briefly 54 useful timber species, with notes on suitable soils, frost-hardiness, growth rate etc. and also 3 ornamental Eucalypts.

265. Strips or Lines at Road, Rail and Canal Sides etc.; Hedgerow Trees

See also No. 3129.

3187. ARBOLI HIDALGO, J. M. El arbolado en las carreteras de la provincia de Alicante. **[Roadside plantations in the province of Alicante.]** *Montes, Madrid* 14 (84), 1958 (491–4). [Span.]

Recommendations as to species, methods of establishment and tending.

266. Shelterbelts, Windbreaks

See also Nos. 3035, 3132, 3336, 3372.

3188. BLENK, H., and TRIENES, H. Strömungstechnische Beiträge zum Windschutz. **[Contributions to the mechanics of flow in wind protection.]** *Grundlagen der Landtechnik, Düsseldorf* No. 8, 1956. pp. 65 + 28 plates. 82 refs. [G.g.]

Reports on extensive wind-tunnel experiments with model hedges of various sizes, shapes, permeability and flexibility, and groups of such, to determine their effects on wind velocities, pressure on buildings, turbulence, and evaporation. The experiments were supplemented by field tests with artificial hedges, and flow tests in a water channel. Roughness of soil surface and turbulence are thought to be the main factors causing differences between field and wind-tunnel results. Among the conclusions are the following: Hedges with uniform permeability of 40–50% give the best protection to leeward. An obstacle simulating a row of small trees with impermeable crowns caused an increase in wind speed immediately to leeward (funnelling effect) but, at a greater distance, the row was as efficacious as a hedge of similar total permeability. An impermeable obstacle having a depth of twice its height or more (e.g. a strip of woodland) reduces wind speed for a shorter distance than, say, a wall of the same height. Rounding the tops of hedges reduces their effectiveness. Permeable hedges reduce, but impermeable hedges (because of increased turbulence) increase evaporation on their leeward side. *From authors' summary.*

3189. LORCH, J. **Analysis of windbreak effects.** *Bull. Res. Coun. Israel* 6*D* (4), 1958 (211–20). 35 refs.

The effect of windbreaks is generally evaluated by their effect on wind speed (v). The wind pressure (p) and energy (E), which are respectively second- and third-degree functions of (v), are generally neglected. The % decrease of (p) and (E) due to a decrease of say 10% in (v) is independent of the initial unbroken (v); but a similar % decrease in (v) produces widely different physiological effects (on transpiration, photosynthesis etc.), depending on whether the free (v) is high or low. The checking of strong winds has a comparatively small effect on physiological functions, while it considerably reduces (p) and (E). Two outstandingly effective windbreaks—*Sesbania* for bananas in Jordan and shelterbelts for wheat in Canada—have raised yields, the first by preventing leaf damage, the second by increasing soil moisture due to snow drifts. Both of these patterns persist and are effective even in still air; both are related to the physical action of the wind as measured by (p) and (E). Therefore the benefit derived from protecting crops, not physically damaged by wind and not subject to snow drift, may reach only a fraction of such benefits. The so-called effective range of a windbreak depends no less on its purpose than on its height and density.

3190. KARSCHON, R., and HETH, D. **Wind speed, wind-borne salt and agricultural crops as affected by windbreaks.** *La-Yaaran* 8 (3/4), 1958 (8–13, 42–38). 6 refs. [Heb.E.e.]

[Cf. *F.A.* 17 No. 3965.] Gives data (Jan.–July 1957) to show the profound effects on wind-speed reduction and transport of airborne salt of a system of windbreaks of 14-ft. *Pennisetum purpureum* [elephant grass].

3191. WILUSZ, Z. Wpływ zadrzewienia ochronnego na gospodarkę wodną i plonowanie przyległych terenow. **[[The effect of windbreaks on the water economy and area yield of neighbouring land.]** *Ekologia Polska, Warszawa* 6*A* (1), 1958 (1–52). 18 refs. [Pol.pol.g.*g.*] Price *Zl.* 12. O.R.S.

Results of measurements in 1953–55 on fields carrying potatoes, oats, winter rye, winter wheat and clover, sheltered by a belt 36 m. broad, are given in graphs and tables. M.a.i. of valuable timbers in the belt (*Robinia pseudoacacia, Quercus* sp. and *Larix* sp.) was 7 cu.m./ha. *From author's summary.*

3192. TRAVEN′, F. I. Polezaščitnoe lesorazvedenie v bor′be s vetrovoj ėroziej. **[Shelterbelt planting to control wind erosion.]** *Zemledelie, Moskva* 6 (9), 1958 (47–52). [Russ.] O.R.E.

In the steppe zone of the N. Caucasus, shelterbelts of Poplar, Ash and *Rhus* spp. have reduced the severity of dust storms which had frequently necessitated the entire replanting of cereal crops. On the most exposed sites (usually S.E. aspects),

belts < 20 m. wide and > 300–400 m. apart were found best; on less exposed sites, narrower belts 700–800 m. apart were best.

3193. KUZ'MIČEV, V. P. Vlijanie lesnyh polos na urožajnost' kukuruzy pri raznoj širine mežpolosnyh polej. **[The influence of shelterbelts, with different distances between belts, on maize yields.]** *Lesn. Hoz.* 11 (6), 1958 (28–32). [Russ.]

Investigations in the S. chernozem region of the Ukraine have shown that the net increase in maize yield (as compared with unprotected areas) decreased from 300 kg./ha. with belts spaced 340 m. apart, to 250 kg./ha. with 600 m. and 140 kg./ha. with 1 km. between belts. For the conditions of the Ukraine it is recommended that the intervening fields should be 550–600 m. wide and 1600–2000 m. long.

3194. SMIRNOV, N. P. Opyt polezaščitnogo lesorazvedenija. **[A shelterbelt planting trial.]** *Zemledelie, Moskva* 6 (9), 1958 (40–7). [Russ.] O.R.E.

An account of the establishment in 1947, development, and effects, of permeable shelterbelts in W. Siberia. Yields of oats, silage maize, lucerne, and spring wheat in protected fields have increased by amounts more than sufficient to cover the costs of shelterbelt planting.

3195. TRAVEN', F. I., and DUBININ, P. S. Vyraščivanie duba s bystrorastuščimi porodami v lesnyh polosah. **[Growing Oak with fast-growing species in shelterbelts.]** *Lesn. Hoz.* 11 (4), 1958 (26–32). 3 refs. [Russ.]

Discusses shelterbelt composition with particular reference to Oak [*Quercus robur*], and proposes the following designs: (1) An 11-row belt—Rows 1 and 11, *Ulmus pumila* var. *arborea* and shrubs; rows 2, 6 and 10 *Acer campestre* or *A. tataricum*, *Fraxinus pennsylvanica* and shrubs; rows 3–5, 7–9 Oak, forming 55% of the belt. (2) A 7-row belt in which rows 1 and 7, and 2 and 6, are the same as 1 and 11, and 2, 6 and 10, in (1), but rows 3–5 are Oak, forming 43% of the belt. (3) A 9-row belt, in which rows 1 and 9 are Birch or *U. pumila* var. *arborea* with shrubs; rows 2, 5 and 8 *Acer platanoides* or *F. pennsylvanica* and shrubs; and rows 3, 4, 6 and 7 are Oak, forming 45% of the belt. Recommendations are made on spacings in and between rows.

268. Pastured Forests. Grazing on Forest and Open Ranges. Forage Plants etc.

See also Nos. 3305 *et seq.*

3196. ALPAY, O. Otlak islahı ve amenajmanı kılavuzu. **[Guide to the improvement and management of grazing areas.]** *Orman Umum Müdürlügü Nesriyatı, Ankara* No. 278, 1957. pp. 112. 27 refs. [Turk.]

Concerned essentially with measures to improve upland forest grazing, e.g. fencing, provision of water supply, shade and windbreaks; soil fixation; irrigation and fertilizing of pasture; increasing forage species; determination of grazing capacity and rotations; with drawings of the chief fodder grasses and herbs to be used.

3197. BASKETT, T. S., DUNKESON, R. L., and MARTIN, S. C. **Ten-year timber cutting cycle provides a continuing supply of forage.** *Sta. Note Cent. St. For. Exp. Sta.* No. 125, 1958. pp. 2. 2 refs.

Forbs, grasses and browse increased significantly 3–6 years after felling had created small openings in a White Oak stand in the S. Ozarks, Mo. After 9 years, tree reproduction and browse predominated, while grasses and forbs had decreased. The 10-year felling cycle applied to managed forests in Missouri should provide a continuing supply of forage, particularly for deer [cf. *F.A.* 17 No. 442].

27. Arboreta. Arboriculture for Ornamental Purposes. Hedges and Hedge Plants

See also Nos. 3180–1, 3187, 3284.

3198. **Trees in town and city.** H.M. Stationery Office, London. 1958. pp. 83. 45 refs. Price 7*s.* 6*d.*

A fully illustrated (107 photos) bulletin dealing with the aesthetic and amenity, as well as arboricultural, aspect of tree planting in existing towns and urban areas, new towns, arterial roads etc., with annotated lists of suitable species for different environments.

3199. BAXTER, S. S. **Subsurface problems of trees and utility structures.** *Trees Mag., Ohio* 19 (1), 1958 (7–8).

A lecture on difficulties caused by the penetration of tree roots into underground waterpipes, sewers etc., and measures taken to deal with them, e.g. careful choice and placing of street trees, root pruning, and flushing with $CuSO_4$.

28. Husbandry of Forest Products Other than Wood

282. Bark Crops

See also Nos. 2899, 2902.

3200. ALVES, A. A. MONTEIRO. A produção de cortiça em solos de xistos e de arenitos na região submediterrânea do sul. **[Cork production on schist and sandy soils in the submediterranean region of the south.]** *Bol. Junta nac. Cortiça, Lisboa* 20 (238), 1958 (273–83, lxii, 58). 5 refs. [Port.e.f.]

A survey was made in Southern Portugal in the region of Grandola and Santiago de Cacém, with the object of determining average cork production in 5 different types of stand, 3 on schist soils and 2 on sandstone, as follows: (1) on lithosols (*a*) without associated crops, (*b*) with a ground cover of lupin; (2) on brown soils growing with barley or lupin; (3) on red Mediterranean (sandstone) soils, (*a*) with associated crops, usually barley, (*b*) with associated crops (usually wheat). Average values are presented for density of stands, girth at breast height, height of stripping, height of stem, number of branches stripped, and diameter of horizontal crown projection. Under present conditions the annual production of cork averages ca. 25 'arrobas' (1 arroba = 15 kg.)/ha. on schist soils and 30/ha. on sandstone soils. Although stands are scattered and badly organized and some over-exploitation takes

place, especially on the lithosols, adequate natural and artificial regeneration assures the maintenance of the present standard of production.

283. Fruit and Seed Crops etc.

3201. Šobek, J. Studie k rentabilitě vlašských ořešáků. **[On the profitability of [growing] *Juglans regia* [in Czechoslovakia].]** *Sborn. čsl. Akad. zeměd.* (*rost. Výroba*) 4 (3), 1958 (293–304). 9 refs. [Cz.cz.russ.] C.G.B.

[Cf. *F.A.* 20 No. 1842.] Analyses data on yields and frost damage in Czechoslovakia, and on this basis suggests where (*a*) plantations, (*b*) small groups of trees or avenues, and (*c*) only individual trees should be established.

284. Crops Tapped for Exudations etc.

See also Nos. 2805–6, 3085.

3202. Clements, R. W. **Longer life for new metal cups on acid-treated trees.** *Naval Stores Rev.* 68 (7), 1958 (6).

Damage to metal cups from acid can be prevented if rain is allowed to half fill the cups before the first acid treatment is applied.

3203. Chudnoff, M. **Production of Pine resin in Israel.** *La-Yaaran* 8 (3/4), 1958 (14–21, 37–31). 19 refs. [Heb.E.heb.e.]

An exploratory study on untapped *Pinus halepensis* (20 trees, one season) indicated a yield of 4 kg./tree in a 20-streak season, using the American method with acid stimulation, which compares very favourably with American production and is higher than that of *P. pinaster*, *P. sylvestris* or *P. halepensis* var. *brutia*, however tapped. Resin flow ceases 8 days after streaking, 45% of it coming in the first 24 hours. The season lasts from March to Sept., with peak yields per streak in June/July. By 1970 there should be 200,000 trees of ⩾ 25 cm. d.b.h., which would cover Israel's domestic needs, but tentative estimates indicate that labour costs would not justify this industry. A low-capacity distillation plant and changes in silvicultural practice (detailed) would be required.

3204. Mazek-Fialla, K. Ekonomik bir faktör olarak reçine istihsali. **[Resin tapping as an economic factor. (Thoughts on the introduction of the resin industry in Anatolia.)]** *Istanbul Üniv. Orm. Fak. Derg.* 7*A* (2), 1957 (1–20). [Turk.g.]

[Cf. *F.A.* 19 No. 3651.] To meet Turkey's estimated annual requirement of 2000 tons of resin, the author advocates: (*a*) attaining this production as quickly as possible, with the least capital expenditure and on the smallest possible area, and (*b*) employing local crafts (e.g. pot making) in its development. *Pinus brutia*, *P. nigra* var. *pallasiana* and *P. sylvestris* are available. At present the American narrow face and stands of defective *P. brutia* are used, some 2,000,000 trees of which would be needed to meet the requirement. With a modern streak method ('*Universalhobelschnitt*' with universal pot-holder), applied to good stands combining production of timber and resin, this requirement could be met from 700,000–800,000 stems at 2·50–3 kg./tree with savings in tools, labour, transport, and organization, and with only one-third of the present labour force. In addition, good stands of *P. nigra* could be tapped so as to meet requirements quickly.

3205. Nájera y Angulo, F., *et al.* Sección de resinas y productos derivados. Técnicas modernas en la resinación de los pinos españoles. Sistema de espina de pescado con cepillo Mazek. **[Resin and resin-products section. Modern techniques in tapping Spanish Pines. Herring-bone system with the Mazek tool.]** *An. Inst. for. Invest. Exp., Madrid* No. 2, 1957 (125–41 + 6 plates). [Span.]

An exposition is given of the German herringbone system, using the Mazek tool, and results are presented of experiments on *Pinus pinaster* in Spain with faces of different widths, with and without stimulants; comparisons are made with the French system. The following provisional conclusions are drawn. Ordinary herring-bone tapping with the Mazek tool can only be used for short spells of 1–2 years and on trees that can give a good yield with faces equal in width to the diameter of the tree; faces are low, and when one face each year (i.e. 2 faces in 2 successive years) is opened, loss of timber is practically nil. In smaller and lower-yielding trees, narrower faces and stimulants should be used. Freshenings are more frequent than in the French system, and the operation requires more skill.

3206. Nájera y Angulo, F. Composición y propriedades de la miera procedente del nuevo sistema de resinación denominando de 'caras multiples'. **[Composition and properties of the resin produced by the new tapping system called Spanish [narrow] multiple faces.]** [*Paper*] *XXVIII Congreso Internacional de Química Industrial* [1955]. pp. [5]. 7 refs. [Span.span.]

Describes the use of multiple narrow faces in resin tapping [cf. *F.A.* 20 No. 1843]. Two types of freshening tool are used. The first, straight-handled with a curved blade, is used for the first freshening, cutting from above downward; the second has a blade at right angles to the handle allowing the freshening on ascending faces to be made by a pulling action. A study has been made of the resin produced. That from multiple faces has a turpentine content equal to or greater than the normal; it is also more homogeneous and has a lower melting point, so that losses in processing are reduced and the rosin quality is high.

3207. David, R., and Lapraz, G. Influence du gemmage sur la croissance du pin maritime. **[The effect of resin-tapping on increment of *Pinus pinaster*.]** *C.R. Soc. Biol., Paris* 152 (7), 1958 (1119–22). [F.f.] O.R.S.

Measurements on two neighbouring trees showed that tapping had little effect on height growth, but that for one tree it considerably reduced diameter increment, which, however, increased again during a period of 8 years' rest, decreasing once more when tapping was restarted. With the second, more vigorous, tree, the diameter m.a.i. remained fairly stable during the 40–50 years of tapping. [Cf. *F.A.* 16 No. 4113.]

3208. DAVID, R., and PONCHET, C. L'influence du gemmage sur la constitution du bois chez le pin maritime. [**The effect of resin tapping on the wood of *Pinus pinaster*.**] *C.R. Acad. Sci., Paris* 247 (3), 1958 (347–9). 7 refs. [F.f.] O.R.S.

The following modifications occur in the sapwood as a result of tapping: reduction in the number of lipid inclusions, especially in the secretory and parenchyma cells, passage of the resin acids into the lumina of tracheids, and disappearance of starch. Distribution of catechuic phloroglucinol compounds appears to be unaffected. [Cf. *F.A.* 19 No. 456.]

3209. KAMIŃSKI, E. Wyniki wstępnych badań Katedry Użytkowania Lasu SGGW w zakresie żywicowania przy użyciu chemicznych środków drażniących. [**The results of preliminary studies by the Forest Products Division of the SGGW [Central School of Agriculture, Warsaw] on resin tapping with the use of chemical stimulants.**] *Sylwan* 102 (12), 1958 (49–55). [Pol.Russ.E.]

Tabulates the results of investigations (made to test the feasibility of using chemical stimulants in Poland) on resin tapping in a 90-year stand of class-II *Pinus sylvestris*, using pastes of H_2SO_4 and $CaOCl_2$. Both pastes increased resin flow and extended its duration, without impairing quality or damaging the trees. H_2SO_4 was the better, improving labour productivity so that one worker could manage 2700 faces instead of the usual 1200. [Cf. *F.A.* 20 No. 1844.]

3210. TOLKAČEV, A. K., and SINELOBOV, M. A. Povyšenie smoloproduktivnosti karry putem predvaritel'nogo ranenija dereva. [**Increasing the resin production of faces by a preliminary wounding of the tree.**] *Gidrol. lesohim. Prom.* 11 (3), 1958 (12). [Russ.] P.R.

Experiments in 1955–57 on 50 Pines indicate that making incisions 3–4 cm. deep to the width of the future face, one year before tapping, will increase resin production by ca. 15% per face in the 1st year and 10% in the 2nd year.

3211. HARITONOVIČ, F. N. Beresklet evropejskij. [***Euonymus europaeus*.**] Goslesbumizdat, Moscow & Leningrad. 1956. pp. 110. [Russ.]

Deals with morphology and ecology; yield of gutta percha compared with other *Euonymus* spp.; influence of density, spacing and cultivation techniques on growth and yield; nursery practice; establishment of plantations and seed stands; regeneration of natural thickets, and measures to increase their yield.

3212. BUKŠTYNOV, A. D. Guttonosy. [**Plants yielding gutta-percha.**] Goslesbumizdat, Moscow & Leningrad. 1957. pp. 197 + 2 plates. 11 pp. of refs. [Russ.]

Deals chiefly with the *Euonymus* spp. of the U.S.S.R., giving an account of their silvicultural characters, the gutta yield of bark from the stem and root, exploitation and regeneration of wild stands, seed husbandry, nursery and plantation practice, selection and breeding, and pests and diseases. One chapter is devoted to the cultivation and exploitation of *Eucommia ulmoides*.

285. Leaf Crops

3213. GÜNTHER, H. Hirschkolbensumach (*Rhus typhina*)—eine Gerbstoffpflanze. [***R. typhina*—a tanstuff plant.**] *Der Deutsche Gartenbau, Berlin* 4 (7), 1957 (195–8). [G.g.] E.M.B.

Briefly discusses trials in progress at Graupa Research station (Tharandt Institute). Tannin content of leaves, which was highest in autumn, was increased in hot dry summers and also by fertilizing, particularly with P. N fertilizing increased total foliage but lowered tannin content. Trials on forest and waste-land soils indicated that *R. typhina* grows reasonably well on loamy sand, heavy loam, light clay, and shallow triassic limestone, but not on waterlogged soils or very poor spoil-mound sands. On good sandy loam at Graupa, yields of 320–350 g. dry foliage per 3-year-old plant (equal to ca. 1500 kg./ha.) were obtained. Propagation by seed [cf. *F.A.* 18 No. 2751] and root cuttings, harvesting (including promising trials with machine harvesting) and drying (particularly quick-drying in a turbulent air stream of 500–600° C.) are described. [Cf. *F.A.* 13 No. 4407.]

286. Osier-Growing

See No. 2755.

287. Bamboo and Cane Growing etc.

3214. FUKUYAMA, G. [**The economic value of Sasa in Hokkaido.**] *Trans. 66th Mtg. Jap. For. Soc.* 1956 (62–6). 15 refs. [Jap.]

Some 3 million chos of waste or disforested land, widely scattered over the island, are now largely occupied by *Sasa* species, which have hitherto been repeatedly burnt (before cropping or to get rid of rats) often resulting in serious forest fires. Sample counts by the author (tabulated) show that ca. 40% of the culms are > 5 years old, and on this basis he shows in tables the areas under Sasa by ownership and their productivity in terms of number and weight of culms. A cutting scheme (4- and 10-year cycles) is outlined for providing fuel and pulp, from which he estimates that a high revenue could be obtained.

288. Crops Grown for Animal Products

3215. SCHMUTTERER, H. Die Honigtauerzeuger Mitteleuropas. [**The honeydew-producing insects of Central Europe.**] *Z. angew. Ent.* 42 (4), 1958 (409–19). 32 refs. [G.g.e.] O.H.

Discusses the importance for honey production of *Psylla ulmi*, 21 Aphidoidea and 6 Coccoidea species, on conifers and hardwoods, time of maximum 'flow', etc., and lists them by host species. The most important are *Buchneria pectinatae* on Silver Fir, and *Physokermes hemicryphus* on Spruce. [Cf. *F.A.* 18 No. 2893.]

3. WORK SCIENCE (WORK STUDIES). HARVESTING OF WOOD: LOGGING AND TRANSPORT. FOREST ENGINEERING

3216. Gläser, H. Titelbibliographie über Literatur von 1953–1957 aus den Fachgebieten Arbeitswissenschaft, Holzeinschlag, Holztransport und forstliches Ingenieurwesen. **[Title bibliography for 1953–57 covering work science, logging, transport and forest engineering.]** Institut für Waldarbeit und Forstmaschinenkunde der Forstlichen Fakultät der Universität Göttingen, Hann.-Münden. [1958]. pp. 479. [G.]

Contains ca. 6500 titles, including the work aspects of all forestry operations (regeneration, protection, mensuration, etc.) arranged according to Section 3 of the Oxford Decimal Classification plus domestic subdivisions. [Cf. *F.A.* 16 No. 498.]

3217. **[Mechanical and chemical technology in forestry.]** *Allg. Forstzeitschr.* 14 (3), 1959 (25–52). 20 refs. [G.]

A special number, with articles on the Technische Zentralstelle der deutschen Forstwirtschaft, TZF (*E. Kmonitzek*) [outlining history, organization and aims (testing and development rather than research on equipment and chemicals)]; chemicals in forestry (*K. Storch*); forest roadbuilding (*H. Schleicher*); modern logging methods (*G. Eisenhauer*); machine depots (*F. Fricke*; *Claasen*); machine use at district level (*Augustin*) etc.

3218. Burwell, R. W. **Report to the Government of Ceylon on mechanical logging and timber production.** Expanded Technical Assistance Program, FAO, Rome. *FAO Report* No. 996, 1958. pp. 24.

The recommendations include the development of a Forest Engineering Branch, adoption of mechanical logging methods, improvement of log transport and storage, and road construction.

30. Work Science (Work Studies): General

See also No. 3216.

302. Man and Work (Physiology and Psychology)

See also Nos. 3236, 3240.

3219. Zelený, A., and Čermák, K. Energetický výdaj při těžbě dříví. **[The expenditure of energy in logging.]** *Práce výzkum. Úst. lesn. ČSR* No. 14, 1958 (67–83). [Cz.russ.e.]

Investigations showed that, in felling Norway Spruce and Scots Pine by hand saw, the energy expenditure (e.e.) per min. was the higher, the greater the stem d.b.h. A layer of snow increased the e.e. and also the time required to fell 1 cu.m., but the e.e./min. was the same as in summer, because of the slower working rhythm caused by the snow. No significant e.e. difference was observed between a petrol-driven and an electric saw, but both saved $> 50\%$ of the e.e. with hand saws. There was no significant difference in e.e. in trimming Spruce and Pine, but barking Spruce required 6–7 and Pine 7·5–9 kcal./min. Barking took 50–60% of the total e.e. expended on felling, trimming and barking. Hand logging of 6 cu.m./shift requires 1200–2300 net kcal., which is more than the 1200 kcal. considered safe.

305. Sequence of Work and Performance (Time and Performance Tables, Evaluation of Work)

See also No. 4027.

3220. Normes de main-d'oeuvre pour les travaux agricoles au Congo Belge. **[Standards of manual performance for agricultural work in the Belgian Congo.]** Institut National pour l'Étude Agronomique du Congo Belge, Brussels. 1958. pp. 204. 35 refs. [F.] Price *Belgian Fr.*100.

Standard specifications for nursery work, planting, tending and harvesting, of a number of plantation crops, and for establishing or enriching forest stands (including line sowing and group planting in dense mixed forest, climber cutting, brush control, poisoning and girdling etc.).

307. Tools, Equipment, Machines and Working Animals: General

See also Nos. 3046–7, 3061, 3081, 3092, 3094–5, 3124, 3149–52, 3170, 3222, 3274, 3380, 3624–5.

3221. **Equipment section.** *Unasylva* 12 (4), 1958 (195–7).

Includes specifications and illustrations of:— Grubber blade for fitting to the International BTD-6 crawler tractor (International Harvester Co. of Great Britain Ltd.); 'Tractamount' rollers (E. V. Twose Ltd., Tiverton, Devon), which converts 4-wheeled tractors into road rollers in a few minutes; Nordverk tractor (A. B. Nordverk, Uddevalla, Sweden), designed for use on all ground and in all seasons: each track-side consists of 2 wire-armoured rubber tracks with steel links fastened with bolts; John Deere 440 crawler tractor and 63 bulldozer (John Deere Industrial Division, Moline, Illinois); 'Conomist' tractor-mounted sprayer (Kent Engineering and Foundry Ltd., Maidstone, Kent); Model 300 Rotomist (John Bean Division, Food Machinery & Chemical Corp., Lansing, Mich.), designed for spraying very high trees; Smallford Automatic Tree Planter (Tractor Shafts Co. Ltd., St. Albans, England), designed to fit on 3-point linkage of any tractor: a 15-in. disk in front of the opening coulter cuts bracken and small roots and also lifts the machine over large hidden obstacles; BHC Iron Fairy (British Hoist and Crane Co. Ltd., Compton, Berks) designed for handling all classes of load from 1 to 2 tons; Porter-Cable gas chain saw (Williams & Jensen International, Porter-Cable Export Dept., South Haven, Mich.); Mater Control Gages (Mater Machine Works, Inc., Corvallis, Ore.), which measure variations in thickness or width of sawn or planed lumber from standard dimensions required; Automated machine for railway sleepers (T. Robinson & Son Ltd., Rochdale, England), which trims, marks, adzes, and bores sleepers at a rate of 10 per minute; controlled by one man from central panel.

308. Planning (Organization) of Work

3222. CLAASSEN, T. Arbeitsplanung und Arbeitsorganisation beim Schleppereinsatz in der Forstwirtschaft. **[Planning and organizing tractor work in forestry.]** *Forsttech. Inform., Mainz* 1959 (1), (2–14). [G.]

Discusses the uses of tractors in logging, soil preparation, road maintenance etc., on the basis of experiences in a Black Forest district, with particular reference to the dovetailing of operations. The merits of centralized *vs.* decentralized administration, of tree-length *vs.* assortment skidding, tractor types, accessories, sequence of operations etc. are dealt with. In general, wheeled tractors of 25–50 h.p., manned by a driver and skilled mate, are thought best.

31. Logging and Transport: General

See also Nos. 3607–8, 3619, 3781–2.

3223. STOJANOV, V., *et al.* Izučavanija vărhu mehanizacijata na dărvodobivnija proces i na transporta na dărvesinata pri potočen metod na rabota v iglolistnite gori. **[Mechanization of logging and extraction using the continuous-flow method in coniferous forest.]** *Izv. Inst. Gorata bălg. Akad. Nauk., Sofia* No. 2, 1957 (175–243). [Bulg.bulg. russ.g.]

With a view to increasing productivity, a study was made in 1954 of logging techniques on a 3½-ha. felling site of Pine, Spruce and Fir, employing two 3-man gangs. This showed that efficiency was lowered because of the lack of skill in using the power saw; productivity was increased by introducing a continuous flow-line, i.e. dividing the work into phases to ensure an uninterrupted process. In the Bulgarian coniferous forests, where felling sites are small and very scattered, mechanization is as yet impracticable and extraction by animals should be continued. Where the ground slopes sufficiently, temporary chutes may be constructed; advice is given on their construction.

32. Felling and Related Operations

322. Felling Season. Preparatory Measures.

See also No. 3262.

3224. WOODFIN, R. O., JR. **Effect of dates of poisoning and harvesting on peelability of Black Hills Ponderosa Pine.** *Res. Note Rocky Mt. For. Range Exp. Sta.* No. 34, 1958. pp. 4.

Trees in a 50- to 100-year stand treated with Na arsenite between 20 May and 18 June 1957, and harvested in November, were barked more easily than trees poisoned at other dates in the growing season. Stain and insect attack were not extensive.

323. Felling and Subsequent Primary Conversion

See also Nos. 3219, 3236 *et seq.*, 3263.

3225. ERIKSSON, E. Utbytet massaved vid aptering i fallande längder och standardlängder. **[The yield of pulpwood by laying off into 'falling' or standard lengths.]** *Uppsats. Instn. Virkeslära K. Skogshögsk., Stockh.* No. 18, 1958. pp. 13 + 17 tbls. 3 refs. [Sw.sw.e.]

[Cf. *F.A.* 18 No. 1660.] Measurements were made on 450 Pine and 534 Spruce from Bispgården forest, to determine the relative yields from laying off into 'falling' lengths or standard lengths of 2, 3 or 4 m. to a minimum top diameter, after the removal of sawlogs to a top diameter of 6 in. Yields from standard lengths were more dependent on species, d.b.h. and stem form than those from falling lengths. Laying off into standard lengths of 2, 3 and 4 m., minimum top diam. 3 in., gave yields of 93, 88 and 81% respectively of the yields from laying off into falling lengths, for Pine, and 94, 89 and 86% for Spruce. The yield for 2-m. lengths was the same as for a mixture of 2- and 4-m. lengths; yields for both Pine and Spruce rose to ca. 97% for a mixture of 2- and 3-m. lengths and to ca. 95% for one of 3- and 4-m. lengths, figures for Spruce being a little higher. When minimum top diameter was reduced to 2½ in. or 2 in. the yield from falling lengths increased by 4 and 6% respectively; corresponding increases for standard lengths were 5–7% and 9–12% respectively, differences increasing with increasing standard length. A study of the loss in volume caused by the failure of the feller to lay off lengths to the specified minimum top diameter (2½ in.) showed a loss of 3·9% of the theoretical maximum yield for Pine and 2·0% for Spruce.

3226. FEDOROVICI, C. Pierderi în volum la secționarea lemnului rotund. **[Volume loss in cross-cutting of logs.]** *Rev. Pădurilor* 1958 (7), (410–3). [Rum.russ.g.f.e.]

Shows by tables, graphs and diagrams the losses caused mainly by varying degrees of deviation from the vertical in cross-cutting, and suggests improvement in maintenance of saws and training of workers.

3227. CRAWFORD, D. B., and YERBURGH, J. **The utilization of small, low quality hardwoods.** *Scot. For.* 13 (1), 1959 (29–33).

Describes the plan followed with Oak of coppice origin aged ca. 80 years, and using contract labour, and discusses the contract, supervision and management, conversion analyses, production costs, marketing, and financial assessment of the operation.

3228. MOLTESEN, P. Udnyttelse og behandling av småvirke av eg. **[Use and treatment of small wood of Oak.]** *Tidsskr. Skogbr.* 66 (4), 1958 (169–78). [Dan.]

Discusses the properties of Oak wood, its treatment (felling season, storage, conversion and seasoning), and actual and potential uses of small wood (for fencing, fishing stakes, flooring, tanstuff and pulp, chipboards, mining timber, charcoal and fuelwood etc.) in Denmark and Norway.

3229. WORLEY, D. P. **Pulpwood or sawlogs from small hardwood trees.** *Tech. Pap. Cent. St. For. Exp. Sta.* No. 156, 1958. pp. 7. 6 refs.

Presents conversion factors from cords to bd. ft. and vice versa, and compares stumpage values on this basis.

33. Degree of Utilization and Waste. Clearing the Felling Site. Harvesting of Small Wood. Salvage Fellings

See also Nos. 3017, 3020, 3164, 3226–7.

3230. KLEPPEN, M. Skogsavfall fra hugget bartrevirke. **[Logging waste from conifers.]** *Norsk*

Skogind. 12 (11), 1958 (445–52). [Nor.nor.e.] P.R.

Presents tabulated results of calculations based on the felling seasons 1952–53 to 1954–55 for state and private forests in the various Norwegian eastern and southern counties, concluding that 169,100 cu.m. out of 262,70 cu.m. of usable logging waste, is left unused annually.

3231. McIntosh, J. A., and Gunn, D. C. **Salvage yarding on the B.C. Coast.** *B.C. Lumberm.* 43 (1), 1959 (22–4). 1 ref.

A time study based on 1048 turns (mean volume 29·6 cu. ft.; distance 10–780 (mean 400) ft.; total paid time 125·7 hours) carried out with a Skagit unit and light equipment on the original spar trees and operated by 5-man crew. Delay and hook-up time accounted respectively for 25·4 and 23% of total paid time. As regards costs, volume per turn was more important than distance.

3232. Stentzel, E. E. Der heutige Stand der Rodetechnik. **[Present position of stump removal technique.]** *Forst u. Jagd* 8 (7), 1958 (321–4). 12 refs. [G.]

[Cf. *F.A.* 14 No. 2289.] Reviews the factors and mechanical principles concerned, and discusses the advantages for various purposes and conditions of the several machine types (some not yet in production) and methods (including explosives) particularly in relation to crater formation, soil compaction and the mechanical production of split stumpwood.

3233. Fricke. Spezialroderaupe TD 14—Ein neues Rodungsverfahren. **[The TD 14 stump grubber—a new grubbing procedure.]** *Forstarchiv* 30 (1), 1959 (23–4). [G.]

Describes the method of work, performance, and use, of the hydraulically operated stump grubber, capable of a 17-ton pull and mounted on a U.S. crawler tractor of 96 h.p. To remove stumps of > 40 cm. diam., the thickest lateral roots are cut by a root rake, the teeth are then driven into the ground and the stump is lifted out and dumped. Technical data and capital and running costs are shown. The grubber weighs 16 tons and cannot be used on soft soils or steep slopes.

3234. Walters, C. S., and Peterson, K. R. **Burning tree stumps with Stumpfyre.** *Circular, College of Agriculture Extension Service, University of Illinois, Urbana* No. 795, 1958. pp. 6.

A method of disposing of stumps has been developed at Illinois Agricultural Experiment Station. The stump is cut off as near ground level as possible and holes 1–1½ in. in diam. and 6 in. deep are drilled at 5- to 6-in. centres. 'Stumpfyre' is then poured into the holes (ca. ¼-cup per hole), the stump is protected for rain and left 2–3 months, and then burned. Stumps may smoulder for 2–3 weeks. 'Stumpfyre' is a mixture of 3 parts by weight $CuCl_2$, 9 parts $Na_2Cr_2O_7$, 2 parts Pb acetate, and 2 parts $MnCl_2$, in water.

34. Storage of Wood in the Forest and at Log Dumps ('Landings')

See also Nos. 3844–5, 3899.

3235. Bobylev, B., and Soromotin, I. Peredvižnaja trosovaja èstakada. **[A movable length of decking.]** *Lesn. Prom.* 1958 (12), (26). [Russ.]

Logs of 24–30 cm. diam. at the thin end are lashed ca. 100 mm. apart by cables to form movable lengths of corduroy-type flooring, which can be laid down as required at loading depots, on ice, slippery ground etc., and then rolled up and moved on to the next site.

35. Performance Measurements for Determining Piece Rates in Felling and Related Operations

See also Nos. 3164, 3219, 3240, 4027.

3236. Hansson, J.-E. En undersökning över arbetsrörelser, arbetsställningar och prestationsnivå hos ett sjuttiotal skogsarbetare. **[A study on working movements, position and speed of 70 forest workers.]** *Rapp. Avd. Arbetslära SkogsforsknInst., Stockh.* No. 1, 1957. pp. 25. [Sw.]

Presents results in graphs and tables of a study of movements of the body, position of the feet and of the hands on the tool, for 70 workers from different parts of Sweden and in different age and experience groups, carrying out felling by axe and handsaw, cross-cutting, trimming and barking. No relation was found between speed of work and position of the hands or feet, or body movements. Workers of medium build had rather higher working rates than those of slender or heavy build but differences were not significant. The fastest workers were between 25 and 40 years old.

3237. Sundberg, U. Svensk huggningsteknik jamförd med mellaneuropeisk. **[Swedish felling techniques compared with those in Germany and Austria.]** *Skogen* 45 (23), 1958 (712–3). [Sw.]

Presents the results of time studies, including physiological studies, at Gmünden in Austria, on the work of 2 fellers from each country and discusses the various reasons (e.g. better tools) for the distinct superiority of the Swedish workers.

3238. Gerritsen, A. G., and Bol, M. Minutentabellen voor het vellingswerk in groveden (*Pinus sylvestris* L.) in Nederland. **[Time tables for felling [primary conversion and extraction] of Scots Pine in the Netherlands.]** *Ned. Bosb. Tijdschr.* 31 (1), 1959 (12–22). [Du.e.g.]

Presents tabulated results of studies in 1954–58 on felling, trimming and barking, in stands with and without undergrowth, diameter o.b. ranging from 4 to 50 cm., on carrying to the roadside for various distances and diameters, and on laying logs and branches out in parallel rows, by d.b.h. gradations in clear felling. [Cf. *F.A.* 19 No. 477.]

36. Tools, Machines and Equipment for Felling and Related Operations

See also Nos. 3061, 3170, 3219, 3221, 3232–3, 3748.

3239. Loycke, H. J. Über Schäleisen. **[Barking irons.]** *Forst- u. Holzw.* 13 (23), 1958 (461–4). [G.]

On the basis of comparative tests of Swedish and German barking irons [not reported here], discusses method of work with, and suitable design and materials for, the tools. Blades should be ca. 2 mm. thick, of chrome-vanadium alloy steel, with a

cutting edge 110–140 mm. wide; handles should be $\lesssim$ 130 cm. long. The relative advantages of four different styles of sharpening, and the results of tests by the Forsttechnische Prüfausschuss on 4 different German irons are discussed.

3240. LUNDGREN, N. P. V., and SUNDBERG, U. Tekniska och fysiologiska studier av maskinbarkning. **[Technical and physiological studies on mechanical barking.]** *Medd. SkogsforsknInst., Stockh.* 48 (1), 1958. pp. 72. 15 refs. [Sw.sw.e.]

Work with the Cambio 35T barker was studied on forest landings both under normal conditions or with systematic variation of certain factors such as feed speed, log size, and gang size (3 or 4 men). Work was heavy and, at high speeds or in unfavourable conditions, output was limited by the capacity of the loaders and unloaders. Optimum length of logs was 3–4 m., though in special log-rolling tests the longest and heaviest logs were most economical of labour. *From authors' summary.*

3241. **Catalogue of mechanical saws for felling and bucking.** *For. Equipm. Note FAO* No. *C. Cat.* 1, 1958. pp. 42. [E.F.]

Gives an alphabetical list of trade names and of manufacturers, followed by technical specifications of 250 power saws—name of manufacturer and model type, h.p., number and capacity of cylinders, source of power, saw-blade length or diameter, total weight, and price (where available).

3242. REISSINGER, G. Die Konstruktionsgrundlagen der Axt. **[The fundamentals of axe design.]** *Forstwiss. Forsch.* No. 11, 1959. pp. 66. 78 refs. [G.g.]

Discusses the parts of the axe, requirements, shape, dimensions and weight of blade and handle; the testing of axes and the advantages of a thin-bladed axe; and the influence of the materials on performance. The development of axe blades and handles is historically reviewed.

37. Transport

372/377. Land Transport

See also Nos. 2726, 3221, 3223, 3260, 3882–3, 3899.

3243. TRIMBLE, G. R., JR., MITCHELL, W. C., and BARR, C. R. **Logging damage no obstacle to tree-length logging.** *Sth. Lumberm.* 197 (2465), 1958 (111–2).

A study based on extensive selective-logging operations with crawler tractor, logging arch and winch in Fernow Forest, N.Va., in which all damaged trees $>$ 5 in. d.b.h. that were considered 'poor risks' were removed, indicated that only 1–5% of the residual stand was damaged in the operations, felling destroying $>$ 3 times as many trees of 6–10 in. diam. as skidding, but fewer trees $\geqslant$ 12 in. There was little difference in amount of damage caused by diameter-limit cuttings and by individual tree selection.

3244. FAUST, E. Einige Mitteilungen über Rationalisierungsmassnahmen beim Holzeinschlagen unter besonderer Berücksichtigung der Bündelung von Schichtholz. **[Measures to rationalize logging, with special reference to bundling cordwood.]** *Forst- u. Holzw.* 13 (24), 1958 (476–81). 1 ref. [G.g.]

[Cf. *F.A.* 19 No. 4261.] Discusses organization, costs and advantages of bundling Beech cordwood, and extracting and transporting the bundles. In the forest district in question, this method was more economical than full-tree or assortment skidding, but is of value only if the whole organization of the district is geared to deal with bundles, and if the extraction, loading and transport is highly mechanized.

3245. Hogst og transport av buntet småvirke. **[Felling and transport of small timber in bundles.]** *Norsk Skogbr.* 4 (23/24), 1958 (676–9). [Nor.]

Discusses the economic size of bundles, stacking, skidding, and loading and unloading, and describes, with illustrations, two new pieces of equipment, both with rubber-tyred wheels to reduce friction, designed by the Skogforsøksvesen for horse-skidding on bare ground. One consists of a pair of large wheels and a double-arched frame of iron tubing, one end supported on the wheels, the other on the shafts. It is run back into position over the stacked wood, and chains from each arch are passed round and under the wood and tightened so that the bundle is raised into position under the arches. The other has smaller wheels forming an extension to the shafts, only one loading arch, and a crossbar between the shafts to support the front end of the bundle. For skidding on very uneven ground or on steep downhill slopes, the back of the bundle can easily be dropped, allowing it to drag along the ground, thus reducing the weight on the wheels and serving as a brake. A bundle frame for use in winter on the normal train of two or more sledges is also described.

3246. THATTIEMROMYA, P. **[Elephant unemployment.]** *Vanasarn* 16 (4), 1958 (8–13). [Siam.e.]

Elephant unemployment is becoming acute in Thailand, partly because less timber is coming out of the forest, but chiefly because of the increased mechanization of extraction. Owners of unemployed elephants are being increasingly driven to illicit felling and extraction in order to recoup themselves for the high cost of maintenance, now about 30,000 Baht (ca. $1500) annually.

3247. BENGTSSON, Å. Om hästkörningsredskap. **[Equipment for horse transport.]** *Skogen* 45 (24), 1958 (758, 761). [Sw.]

Deals mainly with sledges for skidding, giving illustrations of new designs and data on specifications, manufacturers etc.

3248. STREHLKE, B. Rückemittel für das Rücken von Schicht- und Stammholz mit Gespann und Schlepper. **[Skidding devices for cordwood and sawtimber using a horse-team and tractor.]** *Forstarchiv* 29 (12), 1958 (271–2). 10 refs. [G.]

Eleven makes of horse- or tractor-drawn wagons and trailers (mainly German) are illustrated, with data on cost, permissible load by volume and weight, loading height and ground clearance.

3249. OŠTRIĆ, I. Racionalizacija transporta u iskorištavanju šuma. **[Rationalization of transport in forest exploitation.]** *Šum. List* 82 (11/12), 1958 (417–9). [Croat.]

An analysis of costs from felling and extraction at Vinkovac showed that transport (using horse-drawn carts) accounted for 50–56·5% of the total. Tests in hauling Oak logs showed that carting costs could be lowered by ca. 40% if ball bearings were used and pneumatic tyres were substituted for wooden wheels.

3250. **New logging devices shown at fair in Sweden.** *Sth. Lumberm.* 197 (2463), 1958 (39–42).

Chiefly a description of a winch plus yarding sledge or grab, manufactured by Sepson AB, Vansbro, Sweden, and its system of operation by remote radio control. [Cf. *F.A.* 18 No. 498.]

3251. **'Plumett' multi-purpose winch tractor.** *For. Equipm. Note, FAO* No. *C.*27.58, 1958. pp. 2.

Photographs and specifications of a vehicle made by Plumettaz, Bex, Switzerland. Originally designed for use in agriculture and viticulture on sloping terrain, it has recently been adapted and introduced with success to logging in flat as well as hilly country. It is light but powerful, and one of its main features is a capstan winch attached at the trailer's centre of gravity.

3252. LINNARD, W. **Hillside tractors.** *World Crops* 11 (1), 1959 (11–3). 6 refs. O.R.E.

Describes several Soviet 3- and 4-wheeled tractors having a slope-compensating mechanism enabling them to keep their wheels vertical while working across slopes up to 30°. Developed for work in tea plantations, the tractors have a ground clearance of ca. 4 ft. and a max. track width of ca. 7 ft. They are also used for work in forest nurseries on slopes.

3253. DŽEBAŠVILI, I. JA. Tormoženie gruzovyh avtomobilej dvigatelem. **[The braking of loaded lorries by the engine.]** *Lesn. Prom.* 1958 (11), (21–2). [Russ.]

Loaded petrol-driven lorries in the mountainous parts of the Caucasus travel with the brakes on for 45–50% of the total travelling time and for 35–38% of the total distance travelled. A special hand-operated braking device (described and illustrated) was developed which could close both the exhaust pipe and fuel flow of the lorry engine, thus adding significantly to its braking effect. Bench and practical tests showed that the device also increased the working life of the wheel brakes, and saved fuel. The braking units are to be mass produced.

3254. **The Perma spare tire.** *For. Equipm. Note, FAO* No. *B.*17, 58, 1958. pp. 1.

This spare tyre is a thin steel disk with a smooth 2-in. solid rubber tread, weighing ca. 30 lb. It is 1¼ in. thick and slightly larger in diam. than a regular tyre. It can be used repeatedly and can be driven at 40 miles per hour in any road conditions. Manufactured by The Firestone Tire and Rubber Co., Akron, Ohio.

3255. SILUKOV, JU. D. Šiny nizkogo davlenija. **[Low-pressure tyres.]** *Lesn. Prom.* 1958 (11), (19–20). [Russ.]

The 6-wheeled timber-transport lorry ZIL-157, which has 12·00–18 tyres, has been fitted with a system whereby the driver can increase or reduce tyre pressure by actuating controls in his cab even while the lorry is in motion [cf. *F.A.* 20 No. 554]. Tests on the lorry are reported: pressures can be varied from 3 to 0·5 kg./sq. cm., deflation of 6 wheels taking 4 min., and inflation 14 min. The tests were made by the Central Institute for Research on Road Vehicles (NAMI), both in soil tanks, and under practical conditions. A graph is drawn of the relationship between rolling resistance and tyre pressure for surfaces of dry sand and wood-surfaced roads, both for 12·00–18 and 14·00–18 tyres; and another graph is drawn of the relation between tyre pressure and wheel grip for different surface conditions and tyre sizes. It was found, for example, that reducing pressure from 3 to 1 kg./sq. cm. more than doubles the efficiency of travel on sand. Tests continue.

378. Water Transport

3256. LUNDÉN, B. Redogörelse för en studieresa i Canadas flottleder augusti 1958. **[Report on a study tour of Canada's floating system, Aug. 1958.]** *Årsb. svenska Flottledsförb.* No. 32, 1958 (5660–6). [Sw.]

3257. **[Floating costs.]** *Årsb. svenska Flottledsförb.* No. 32, 1958 (5625–59). [Sw.]

Comprises 2 papers by *G. Forssell* and *S. Gränge* on the present distribution of costs in Sweden by districts, assortments etc. and proposed amendments, with discussion.

3258. **Ice landings.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1798 (*B-9-a*), 1958. pp. 9. 12 refs.

Two articles: (1) Ice landings (*C. H. Duff*), a general account of strengthening ice sheets, and of the equipment and techniques used. (2) The preparation of ice landings by pulp and paper companies in Eastern Canada (*L. B. Rose* and *C. R. Silversides*), discussing, on the basis of practical experience, the preparation and maintenance of ice landings, the construction of ice roads and bridges, and salvage of vehicles that have fallen through the ice. An appendix contains summaries of reports by 6 companies (from Manitoba to E. Quebec) on local practice in the preparation and maintenance of ice landings.

3259. SAMUELSSON, B., and AGER, B. H. Isens egenskaper och preparering av is för virkesavläggning. Några orienterande försök. **[The properties of ice and its preparation for timber storage. A preliminary study.]** *Norrlands SkogsvFörb. Tidskr.* 1958 (4), (437–509). 16 refs. [Sw.e.]

The first part deals with the physical properties of ice [cf. *F.A.* 19 No. 4314], discussing earlier research and summarizing results of field experiments in 1956–57 and 1957–58 on temperature, rate of freezing of different proportions of snow and water (model experiments in buckets), the bending strength of ice, its modulus of elasticity, its deformation under different static and moving loads (measured on a track running parallel to the shore

and 15 m. from it), vibration in the ice sheet resulting from crawler and wheel traffic, and photographing ice samples in polarized light. Results include the following: the rate of freezing of compacted watered snow is about double, and that of loose watered snow 1¼ times that of water; bearing strength is roughly the same for snow-ice (*a*) (from completely saturated snow) as for black ice (i.e. from freezing water) (*b*): no difference in bearing strength was found between (*a*) and (*b*) for a given thickness of ice sheet; the maximum strain on the ice sheet should be 4 instead of the generally accepted 8 kg./sq. cm.; compacted snow on ice does not seem to reduce vibrations in the ice caused by crawler vehicles, but possibly increases them. The second part deals with treatment of the ice to prepare it for timber storage. Preliminary experiments with various types of equipment (illustrated)—e.g. rollers, sliding compactors, drawn by jeep or tractor, and pumps for watering the ice, were made in 1956–57 and 1957–58 and will be continued in 1958–59. A specially designed sliding compactor that is easy to transport and will carry the pumping components, proved suitable for most snow and ice conditions. If the ice is too thin for snow packing and the snow depth is small, watering to increase ice thickness may be possible. If the ice will bear heavier equipment, direct watering of the snow will be possible for a snow depth of 10–15 cm., but for greater snow depths the snow should be packed before watering, because packing considerably reduces the time spent on watering and its cost.

3260. PEGUŠIN, A. I., and POZNANSKIJ, S. M. Pricep k traktoru S-80 na zimnej splotke. [**A trailer for the S-80 tractor for bundle assembly in winter.**] *Lesn. Prom.* 1958 (11), (25–6). [Russ.]

In the Gainsk lespromkhoz, Perm [Molotov] region, a 2-runner sledge, trailed behind an S-80 crawler tractor, has been designed with a special device for loading, transporting, and unloading bundles of logs. This consists of a rocking frame mounted on the base of the sledge; the tractor backs the sledge so that the ends of the frame are under the bundle to be unloaded, e.g. from a railway wagon. The bundle is then pulled forward by the tractor's winch on to the rocking frame and transported transversely on it. To unload the bundle, the rocking frame is raised, and the bundle slides off. In trials, where bundles had to be moved 400 m. from railhead to raft assembly point, 3 men and one tractor/sledge unit handled 153 cu.m. per [8-hr.] shift.

3261. SEVAST'JANOV, V. A. Novoe v formirovanii morskih plotov. [**New points in making sea-going rafts.**] *Lesn. Prom.* 1958 (11), (28–9). [Russ.]

An experimental, sea-going raft was made at the Astrakhan floating depot by a new method by a 9-man team. Five men guided the large log bundles in the water to the crane, opened them, made them into small bundles (mean vol. 3·12 cu.m.), fitted slings and lifted them by crane on to the raft, where the second gang (4 men) trimmed them up, bound them with wire ropes, (12·5–15 mm. diam.), and bound them in place. The raft was towed across the Caspian from Astrakhan to Baku (875 km.) at an average speed of 6·73 km./hour, force-7 winds and waves > 2 m. high being encountered. Conventional rafts became loose and required repairs on the way, but the experimental one gave no trouble, and was also easier to dismantle and take out of the water, using the bundle fastenings to attach the crane hooks. The only disadvantage noted was the extra length of steel cable needed by the new method.

3262. NYLINDER, P. Flytbarheten hos helbarkad sulfatved etter ett års vattenlagring. [**The buoyancy of completely barked sulphate wood after a year's storage in water.**] *Uppsats. Instn. Virkeslära K. Skogshögsk., Stockh.* No. 19, 1958. pp. 18 + 49 tbls. [Sw.sw.e.]

Material used was felled in May, July and August 1956 from a stand containing 90% Pine and 10% Spruce (200 trees each time), cut to pulpwood size, completely barked, and stored on land until it was launched into the floating channel in September. The storage site did not favour drying, and only the logs felled in May reached the minimum moisture content consistent with air temperature and humidity. The investigation showed that in September 1957, after 12 months' storage in water (including 6 months frozen in), the logs with a risk of sinking (i.e. of density > 980 kg./cu.m.) amounted to 3% of the total for material felled in May; the sinking risk decreased with increasing dimensions, and for logs with a top diam. > 6 cm. the sinking risk was 0·4% in September and 0·05% in August. For material felled in July and August and insufficiently dried, the sinkage risk was 3·7 and 42% respectively; here the relationship between sinkage risk and dimensions was much less clear. Recommendations for selection and treatment of Pine for floating include the following: (1) top diam. should be ⩽ 2½ in.; logs should not be launched more than 6 weeks before freezing of the waterway is expected; (3) logs should be thoroughly dry before launching; if the log dump allows good drying, felling can continue until mid-July, but otherwise it should be complete by July 1. Spruce can be expected to give slightly better results than Pine.

3263. SANDBERG, B., and SILVER, H. Maskinbarkning av massaved. [**Mechanical barking of pulpwood.**] *Skogsägaren* 35 (2), 1959 (28–9). [Sw.]

A comparison of hand- and machine-barked logs from the same 70-year Pine stand showed that the latter dried less during 2 months' land storage and were consequently more likely to sink in floating; although they took up less water during two months' water storage, the difference was insufficient to outweigh the poorer drying. The need for good drying conditions for machine-barked pulpwood logs is stressed.

3264. KORŽENEVSKIJ, Ė. Ė. Zimnjaja očistka i uglublenie rejdov. [**Cleaning out and deepening floating depots in winter.**] *Lesn. Prom.* 1958 (12), (28–9). [Russ.]

Describes operations with the Ė-505 track-laying excavator, which has a dragline bucket of 0·75 cu.m. capacity. The excavator is driven out on to the ice (⩽ 50 cm. thick), and breaks a hole in it. The mud, boulders, sinkers etc. are dredged up, deposited on

the ice behind the excavator, and moved away by bulldozer. Specimen rates of work are tabulated for ice thicknesses of 50 to 100 cm., 3 types of river bed, and 3 degrees of bed silting and blockage.

38. Forest Engineering

3265. Huggard, E. R. **Foresters' engineering handbook.** W. Heffer & Sons Ltd., Cambridge. 1958. pp. viii + 149 + 5 photos. Price 18*s*.

Written essentially for U.K. conditions, it includes chapters on: road planning, the forest road, drainage, types of forest road, preparation for road work, road construction and road base material, the bulldozer, other civil engineering plant, beam and girder calculations, bridge construction, quarrying and explosives, miscellaneous forest works, timber extraction, map reading and surveying, and aerial photography.

383. Roads and Bridges

See also Nos. 2726, 3221, 3259, 3607–8, 3619–22.

3266. Rădulescu, H. In problema lăţimii drumurilor forestiere. **[The width of forest roads.]** *Rev. Pădurilor* 1958(9), (529–31). 11 refs. [Rum. russ.g.f.e.]

Discusses the general principles of road width, and concludes that the minimum width of driving surface should be 4 m., or better 4·5 m. Tabulated data are given on widths of (*a*) driving surface, (*b*) formation, on forest roads of different classes in France, Austria, Sweden, Hungary, the U.S.A. and Czechoslovakia, together with FAO standards.

3267. Herpay, I. Egyjáratú erdei makadámutak korszerúsítése. **[Modernization of single-line metalled forest roads.]** *Erdészettud. Közl., Sopron* 1958 (1), (237–46). [Hu.hu.russ.e.g.*russ.e.g.*]

Discusses the reasons for deterioration, the changes necessitated by changed traffic conditions etc., and proposes ditches with a triangular instead of a rectangular section, which would increase the usable width of the road.

3268. Toivola, E. Havaintoja erillaisten hevosvarsiteiden ominaisuuksista. **[Observations on the characteristics of various main horse-haulage roads.]** *Tied., Metsäteho, Helsinki* No. 152, 1959. pp. 9. [Fi.e.]

Discusses the merits of ploughed and iced roads *vs.* uniced packed snow. The sliding resistance of the sleigh is an important factor.

3269. Effektiv utstyr for snøpakking. **[Effective equipment for snow packing.]** *Norsk Skogbr.* 4 (23/24), 1958 (694). [Nor.]

Describes a tractor-drawn roller, and gives illustrations of a scoop-shaped vibrator, used successfully last winter, mounted in front of the tractor and run from the engine.

3270. Schleicher, H. Fortschrittliche Technik bei der Instandsetzung und Räumung von Banketten und Seitengräben an Waldwegen. **[Modern equipment for the maintenance of verges and side ditches of forest roads.]** *Forsttech. Inform., Mainz* 1958 (12), (91–100, 102). 9 refs. [G.]

Includes illustrated descriptions, with specifications, of the Kixmöller verge trimmer (with elevator conveyor), the Schmidt verge trimmer attachment to the Unimog tractor, the Wittenburg, Vakola, Moorburg, and Poclain dredging and ditching equipment, and others.

3271. Schönauer, H. Wasserspulen aus Bandstahl. **[Drainage channels made of steel strip.]** *Allg. Forstztg.* 69 (23/24), 1958 (306–7). [G.]

Road drainage channels of 4- or 5-mm. steel plate, bent to a rectangular profile, 10 cm. wide and 8·5 cm. deep, or a pentagonal profile, 8 cm. wide and 12 cm. deep, both completely open at the top, have proved satisfactory in short, small-scale trials. They did not silt up, drained well, and were neither deformed nor loosened by heavy traffic.

384. Protective Works, including Torrent Training

See No. 4018.

385. Drainage, Irrigation, Sedimentation. Water Supply

See No. 3270.

387. Telephonic Communications etc.

3272. Varga, R. Š., and Kral'kin, A. S. Radiosvjaz' na lesozagotovkah. **[Radiocommunications in forest exploitation areas.]** *Lesn. Prom.* 1958 (11), (16–8). [Russ.]

Two-way short-wave radio sets have recently been used successfully in the Olenino and other lespromkhozes to maintain contact with rail and road transport conveying wood. Several different Soviet radio sets are described, the RRS-1, CRS-2, ARS-2, ZR-4P and the ZR-4S, and their relative merits discussed. The portable 10-watt ARS-2, which is still being modified and improved, is the best model for use on lespromkhozes. It can be fitted on lorries, electric trains, etc., is fed from 12-volt accumulators, and works at 36–46 megacycles/sec. It can be used for distances of up to 32–33 km., to make contact with another similar set, but used in conjunction with a large central CRS-2 set (80-watt), this range is considerably increased, and reception improved.

4. FOREST INJURIES AND PROTECTION

See also Nos. 2880, 2902, 2997, 2999.

3273. Poseban broj o zaštiti topola. **[A special number devoted to Poplar protection.]** *Topola, Beograd* No. 6, 1958 (429–55). [Serb.some f.]

Includes articles on: *Sciapteron tabaniformis* and its control (*D. Tomić*); *Saperda populea* and its control (*S. Živojinović*); the distribution and significance of *Cytospora chrysosperma* in plantations in Serbia (*M. Kostić, P. Marinković*, and *S. Šmit*); the main pests and diseases of Poplar in Slovenia (*S. Hočevar*); insect pests of soft broadleaved species in Bosnia and Herzegovina (*E. Georgijević* and *V. Vaclav*); insect pests of soft broadleaved species in Macedonia

(*K. Vasić* and *D. Tomić*); infection by *Dothichiza populea* in Serbia in 1956 and 1957 (*D. M. Kostić*, *P. Marinković* and *S. Šmit*). Practical advice on control of insect pests, rodents and diseases is given. Other articles are noticed separately.

41. General Technique of Forest Protection. Types of Injury

See also Nos. 3216–7, 3221.

3274. **Pulsavia duster-sprayer**. *For. Equipm. Note*, *FAO* No. *E*.16.58, 1958. pp. 1.

Briefly describes an apparatus based on the use of valveless pulsoreactors, and manufactured by Pulsavia, 27 Rue de Marignan, Paris 8. [Cf. *F.A.* 18 No. 2951.]

3275. ZEUMER, H. Rückstände von Pflanzenschutz- und Vorratsschutzmitteln, von sonstigen Schädlingsbekämpfungs- und Unkrautbekämpfungsmitteln sowie von Mitteln zur Beeinflussung des Pflanzenwachstums. Literatur-Übersicht. **[Residues of preparations for the protection of plants and stores, other pesticides and herbicides, and growth-regulating preparations. A bibliography.]** *Mitt. biol. Bundesanst. Land- u. Forstw., Berl.* No. 94, 1958. pp. 124. Many refs. [G.]

Contains chiefly references for the years 1955–57, classified into sections on the extent of residues in crops etc., effects on animals, effects on plants, residues in the soil, effects on soil fauna and flora and methods of determination of residues.

42. Injuries from Inorganic Agencies other than Fire

421. Air Currents

See also No. 2984.

3276. NELSON, T. C., and STANLEY, G. W. **Hurricane damage related to thinning intensity in East Texas Slash Pine plantations**. *J. For.* 57 (1), 1959 (39).

Plots of *Pinus elliottii* var. *elliottii*, thinned from below in 1956 and damaged by hurricane 'Audrey' in 1957, showed a direct relationship between thinning intensity and the damage done. This was most severe on the heavily thinned plots, and within each plot worst on the trees of largest diameter.

422. Temperature Influences. Frost. Heat. Drought

See also Nos. 3163, 3201, 3529.

3277. REEKS, W. A. **Weather injury to trees in Manitoba**. *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (5), 1958 (1–2).

Unusual weather in Manitoba (only half the normal precipitation from March to May 1958, abnormally mild weather at the end of March 1958, and a severe frost on 29 April 1958) resulted in 'winter drying' and killing of buds. The former condition resulted in rapid browning of conifers (most severe in Balsam Fir) and the latter in damage to Aspen (severe) and other species, including some conifers.

3278. JAHNEL, H., and WATZLAWIK, G. Beobachtungen über die Frosthärte einiger Gehölze im Winter 1955/56 im forstbotanischen Garten zu Tharandt. **[Observations on the frost hardiness of some woody species in the Tharandt Arboretum in winter 1955–56.]** *Repr.* from *Wissenschaftliche Zeitschrift der technischen Hochschule Dresden* 6 (3), 1956/1957 (543–8). [G.]

Includes many American and Eastern conifers and hardwoods. Effects differed considerably between individuals of a species, and also from those of earlier severe winters, presumably because of the warm January that had preceded the severe February frosts.

3279. GERASIMOV, M. V. Mutovčatoe vetvlenie i listoraspoloženie na poroslevyh pobegah evkalipta i verojatnye pričiny ego vozniknovenija. **[Whorled branching and leaf arrangements on coppice shoots of Eucalypts and probable causes of its origin.]** *Repr.* from *Bjulleten' Moskovskogo Obščestva Ispytatelej Prirody* (*Otdel Biologii*) 63 (5), 1958 (65–70). 13 refs. [Russ.e.]

When various species of Eucalypt were left over winter in the open in Transcarpathia (1950–54) and Moscow (1954–56), and partially protected by earthing-up etc., some species were killed outright by frost, while others, though killed back, coppiced in the spring. The coppice shoots of the survivors showed a marked tendency to produce leaves and branchlets in whorls of 3–4, and in the Transcarpathian trials this tendency increased in consecutive years. The author regards the whorled arrangement, which increases the leaf area, as an adaptation to loss of the previous year's foliage combined with a shorter growing season and different photoperiod, giving his reasons for rejecting fasciation as an explanation of its occurrence.

3280. SCHRAMM, J. R. **The mechanism of frost heaving of tree seedlings**. *Repr.* from *Proceedings of the American Philosophical Society, Philadelphia* 102 (4), 1958 (333–50). 35 refs.

Discusses a study on the causes and effects of frost heaving of seedlings growing in anthracite waste (culm), in which heaving occurs in some conditions in the same manner as in soils, but on an exaggerated scale. Photographs are given showing the ice columns formed vertically to the surface, the frozen surface after heaving, and seedlings still in position, held in the frozen surface before thawing takes place, or pulled up by the heaving action and prostrate on the surface or, when very firmly rooted, torn in two. In another form of injury, hard rain splashes culm particles on to the stem, building up a cone of wet culm, which may freeze tightly to the seedling stem. It was found that by late October all seedlings (*Diospyros virginiana*, *Pinus* spp. and *Quercus* spp.) from spring sowings had been severed or pulled out, but that some 400 transplants of Pine species of various ages planted out near by showed no evidence of heaving. Some of the transplants were no larger in stem diameter than the best Oak seedlings, and were less firmly rooted. The explanation of the absence of damage to the transplants is that they sway to and fro in any air current, exerting lateral pressure on wet culm and forming a free space round the stem; thus when the culm

freezes, a frozen ring, free of the stem, moves harmlessly up and down, leaving the transplant undisturbed. Oak seedlings, leafless in the critical period, would need very strong winds to move them, and 1-year Pine seedlings are too thin-stemmed and flexible to exercise the necessary pressure. 'Kammeis' is suggested as the most acceptable [loanword] term for a surface crust of ice with vertical ice needles below it. Other American and European literature on the subject is discussed.

3281. VAARTAJA, O. **Winter damage in a Saskatchewan nursery.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (5), 1958 (2).

Describes damage caused by an abnormally thin snow cover and very low temperatures during the winter 1956/57. The chief injury was 'winter drying' of transplants above the snow line. No natural snow-mould damage occurred, and the disease did not develop in beds artificially inoculated with the pathogens.

423. Precipitations

See also No. 3456.

3282. PECHMANN, H. VON. Über die Heilungsaussichten bei hagelbeschädigten Waldbeständen. **[The prospects for recovery in forest stands damaged by hail.]** *Forstwiss. Cbl.* 77 (11/12), 1958 (357–73). 7 refs. [G.g.]

Reports investigations made in 1957–58 in the Alps foreland, on Spruce, pure and in mixtures with Silver Fir/Beech, after damage by a severe hailstorm in July 1956. Spruce, even on the best sites, died if > 60–70% of its foliage had been destroyed. External indications did not allow reliable assessment of stem decay danger, and the reduction of foliage rather than the degree of stem damage seemed to determine stem recovery or otherwise. Resin flow after the storm seemed to be an indication of tree vitality rather than the reverse. Beech survived the hail better than the conifers, but its quality was seriously lowered by patches of decay, stem and branch epicormics, and galls.

424. Soil Conditions. Erosion Effects. Nutrient Deficiencies etc.

See also Nos. 3515, 3530.

3283. LOHWAG, K. Ormanda zelzele zararları. **[Earthquake damage in the forest.]** *Istanbul. Üniv. Orm. Fak. Derg.* 7*A* (2), 1957 (37–40). [Turk.g.]

A note, with photographs, describing the damage to trees and the danger to personnel from earthquakes in forests. An open earth-crack with torn roots, a 7-cm.-diam. root snapped, and a Fir stem [*Abies* sp.] split vertically are illustrated. The vicinity of rotten trees and earth-cracks should be avoided during an earthquake.

3284. TRAAEN, A. E. Undersøkelser over skade av kalsiumklorid på gran langs vei. **[Injury to Norway Spruce along the roadside by $CaCl_2$ [used to reduce road dust].]** *Medd. norske Skogforsøksv.* 15 (3), No. 51, 1958 (333–74). 11 refs. [Nor.nor. e.*e.*]

A detailed account, with tabulated data, of observations in 1939, and experiments in 1939–41 already briefly reported [see *F.A.* 16 No. 595].

3285. INGESTAD, T. **Studies on manganese deficiency in a forest stand.** *Medd. SkogsforsknInst., Stockh.* 48 (4), 1958. pp. 20. 17 refs. [E.e.sw.*sw.*]

As preliminary experiments had suggested Mn deficiency as responsible for chlorosis in current needles of Spruce and in Birch (though not in Pine) on a drained fen (pH > 8), $MnCl_2$ was tried as a soil fertilizer (ca. 100 kg./ha.), in foliage sprays (0·42–2·10 g. Mn/tree) and by stem injection (70 g./tree). Symptoms diminished or disappeared, though for soil treatment only after 3 years, and for stem injection only above the injection hole. Spraying was completely successful, except for Birch at the lowest dosage. All treatments increased the Mn content of foliage, chlorosis generally disappearing at ca. 0·002% for Spruce and > 0·0017% for Birch. Soil treatment caused foliage Mn contents to rise before symptoms disappeared. Growth responses were observed after all treatments. *From author's summary.*

3286. LAFOND, A. Les déficiences en potassium et magnésium de quelques plantations de *Pinus strobus*, *Pinus resinosa* et *Picea glauca* dans la province de Québec. **[K and Mg deficiencies in some plantations of *Pinus strobus*, *P. resinosa* and *Picea glauca* in the province of Quebec.]** *Contr. Fonds Rech. for. Univ. Laval* No. 1, 1958. pp. 24. 20 refs. [F.e.]

Leaf analysis showed that K and/or Mg deficiency in the Pines, and K deficiency in the Spruce, induce chlorosis and necrosis of the needles and directly affect tree growth. Applications of KCl at 200 lb./acre and $MgSO_4$ at 50 lb., cured the chlorosis and rapidly stimulated growth. [Cf. *F.A.* 17 No. 517.]

3287. GILMOUR, J. W. **Chlorosis of Douglas Fir.** *N.Z. J. For.* 7 (5), 1958 (94–106).

Chlorosis followed by stagnation of up to 80% of newly established Douglas Fir in 3 State forests in New Zealand is described. Investigations showed that this condition was caused by poor development of a particular type of mycorrhiza in the heavy clay soils occurring in these forests and in Milton nursery. Only stands established with Milton planting stock were severely affected. Interim results from experimental plots showed that seedlings from Tapanui nursery and Milton seedlings treated with litter from a healthy Douglas Fir stand at time of planting, were far superior to untreated Milton seedlings in transplantability and survival. Lack of mycorrhizal development in Milton nursery appears to be due to absence of proper inoculation and possibly to periodic anaerobic soil conditions.

3288. DEKOCK, P. C., and MORRISON, R. I. **The metabolism of chlorotic leaves. 1. Amino acids.** *Biochem. J.* 70 (2), 1958 (266–72). 26 refs. O.R.S.

Results include those for Beech leaves, collected in June and Aug. 1956, which showed abundant amino acids in the younger leaves and a marked decrease in the older ones.

425. Chemical Influences (Atmospheric)

See also No. 3190.

3289. KURATA, M., and HASHIMOTO, A. **[Study of early recovery in smoke-damaged areas. (II). Policy in the smoke-denuded area in Ashio [central Honshu].]** *Trans. 65th Mtg. Jap. For. Soc.* 1956 (261–4). [Jap.]

Describes the nature and extent of the damage in the vicinity of a copper smelting plant, where up to 30,000 ha. are more or less affected; these include 2780 ha. denuded of trees, especially to the N.W. of the plant (1000 ha. quite bare), which is a Pine forest area and subject to S.E. winds during the growing season. The authors planted 250 each of 21 conifers and hardwood tree species within 100 m. of the polluting chimney in May 1955, as a test of smoke tolerance, the results after 2 and 3 months being tabulated. Among the most tolerant were: *Fraxinus sieboldiana, F. verecunda, Prunus donarium, Betula schmidtii, Chamaecyparis obtusa, Quercus crispula, Q. serrata, Sapindus mukurossi* and several species of *Sasa*; among the least tolerant, *Acer rufinerve, Alnus japonica, A. multinervis, A. hirsuta, Castanea pubinervis, Morus bombycis* and *Zelkova serrata.* It was noted that species having a high N content in their leaves were tolerant, and also grew best on the poorest land; and that both *Clethra barbinervis* and *Alnus japonica,* while intolerant, recovered quickly, the former forming conspicuous thickets. Recommendations for rehabilitating the whole area are made, erosion control being considered an essential feature.

3290. BOBKO, E. V., and FORTUNATOV, I. K. Opyty himičeskoj bor'by s usyhaniem lesonasaždenij v gorodskoj obstanovke. **[Chemical control of smoke damage in plantations near towns.]** *Izv. Timirjazev. sel.'-hoz. Akad., Moskva* No. 6, 1958 (221–6). 28 refs. [Russ.e.] O.R.E.

Reviews mainly Russian and American work on the effects of air pollution on trees, indicating three ways of tackling the problem: (1) fertilizing, to improve the plants' resistance; (2) sprinkling to wash off harmful substances; (3) neutralization of SO_2, SO_3, F etc. by spraying with solutions of ammonia (0·2–2%), with or without urea.

3291. KARLÉN, A., and TYDÉN, Å. Waldrauchschäden an einem Schieferölwerk in Schweden. **[Smoke damage to forests caused by shale-oil cracking in Sweden.]** *Allg. Forstzeitschr.* 13 (42), 1958 (601–3). [G.]

SO_2 from the burning of the shale residue as fuel was the chief trouble. Increment losses, ascertained by sample borings, were considerable, particularly for conifers, extending ca. 8 km. downwind of the main wind and ca. 4 km. at right angles to it. The agreed principles of compensation, based on 5-yearly assessments, are described. In addition to Kr.125,000 p.a. for damage to forests, Kr.100,000 are paid annually for corrosion of fencing etc., to foresters and others.

3292. LINZON, S. N. **The influence of smelter fumes on the growth of White Pine in the Sudbury region.** Ontario Department of Lands and Forests, Toronto. 1958. pp. 45. 25 refs.

[Cf. *F.A.* 13 No. 1288; 16 No. 598.] Ca. 7000 *Pinus strobus* trees, aged 50–90 years, were examined annually from 1949 to 1954, at different distances from large smelters operated by mining companies. The prevailing winds are from S.W., and foliage on trees < 25 miles N.E. of Sudbury showed more extensive injuries each year than foliage on trees further away. There was a gradual decline in annual diameter increment in areas near the smelters, and volume loss through mortality in all age classes exceeded total annual volume increment of surviving trees. At distances > 25 miles N.E. of Sudbury the condition of *P. strobus* improved remarkably. It is indicated that the combination of concentration, frequency, and duration of atmospheric SO_2 visitations has here declined to a threshold value for the inhibition of growth of *P. strobus. From author's abstract.*

3293. TONZIG, S. **Plants as indicators of the presence and intensity of action of some atmospheric contaminants.** *Minerva Medica, Roma* 1958 (1085–91). [It.?] From *abstr.* in *Chem. Abstr.* 52 (14), 1958 (12286). P.R.

A discussion giving a series of decreasing sensitivity to SO_2 beginning with *Prunus avium* and ending with *Acer platanoides.* For HCl vapours, greatest sensitivity is found in *Carpinus betulus,* least in *Alnus* spp. During the first appearance of green leaves, the minimum damaging concentration of SO_2 is $1:5 \times 10^5$, and as growth occurs, $1:1 \times 10^6$. The more resistant plants are damaged at 1:12,000 but resist 1:16,000. For NH_3, roses show damage at 1:112,500 after some days.

43. Forest Fires

431. Predisposing Factors and Causes. Fire Danger. Fire Behaviour

3294. WILSON, G. U. **A capability study of forecasts of maximum temperature, relative humidity, dew point, wind and precipitation in several states with special application to fire weather requirements.** *Australian Meteorological Magazine, Melbourne* No. 21, 1958 (31–48). L.M.O.

The reliability was examined of forecasts of (1) max. temperature, (2) dew point, (3) r.h., (4) precipitation and thunderstorms, and (5) wind, made at some or all of the following weather stations in or near State forests: (*a*) Coffs Harbour (N.S.W.); (*b*) Mount Burr (S.A.); (*c*) Wirrabara (S.A.), and (*d*) Dwellingup (W.A.). Forecasts of (1) are generally sound (9-hr. forecasts being more accurate than 24-hr. ones), but not for temperatures > 90° F. Forecasts of (2), (3) and (4) need to be improved. Forecasts of (5), analysed only for (*a*), were generally sound, but wind direction was inaccurate on 4 out of 5 occasions when wind speed exceeded 16 m.p.h. The need for improved techniques to forecast (2) is emphasized.

3295. ROBIN, A. G., and WILSON, G. U. **The effect of meteorological conditions on major fires in the Riverina (New South Wales) district.** *Australian Meteorological Magazine, Melbourne* No. 21, 1958 (49–75). 6 refs. L.M.O.

The effects of atmospheric temperature, r.h., wind speed, and previous rainfall on the incidence of major fires (i.m.f.) were studied. At air temperatures > 105° F., i.m.f. depends on air temperatures, and not on r.h. At air temperatures of 95–105°, changes in temperature and in r.h. are equally important in determining i.m.f. At air temperatures < 95°, i.m.f. depends on r.h. and not on air temperature. Wind speeds < 25 knots had little bearing on i.m.f., which agrees with findings in the U.S.A. [cf. *F.A.* 15 No. 3689]. The lack of knowledge of local wind circulation near large fires and its relationship to general wind circulation is stressed. Integration of the meteorological parameters, together with the dew-point parameter, gives good enough separation between major fire days and others to allow the use of diagrams as a forecasting aid.

3296. ROBIN, A. G. **Weather conditions associated with the Broadford fire.** *Australian Meteorological Magazine, Melbourne* No. 18, 1957 (30–43). 1 ref. L.M.O.

Describes the behaviour of a bush fire in Victoria in Feb. 1957, with estimates of the average linear and areal rates of spread (25 chains and 150 acres/hour). The preceding seasonal rainfall distribution and climatic conditions are discussed in relation to their effect on the amount and degree of drying of light fuels in the area. It is shown that the fire flared up, not under the influence of hot, gusty N. winds (the usual danger weather in Victoria), but under a cool, S. wind-front.

3297. VOWINCKEL, E. **Fire-danger rating.** *J. S. Afr. For. Ass.* No. 31, 1958 (58–73). 17 refs. [E.e.afrik.]

Describes experiments designed to develop an objective rating system. The chief semi-permanent factor, under S. African plantation conditions, is the condition of the needle layer: speed of spread increased with its thickness, but less than proportionately, the greater density of thick layers and their steeper moisture gradients acting as retardant factors. For moisture content (one of the two most important variables, the other being wind) a zero rating for ignition is assumed when the sum of m.c. % at top and bottom is > 80, and a rating of 100 when it is < 25% at both top and bottom. The final rating table, combining ignition and spread danger into one moisture factor which, multiplied by a wind factor, gives the danger rating, and which allows prediction of changes in m.c. under certain meteorological conditions, is to be discussed in a future paper. [Cf. *F.A.* 19 No. 544.]

432. Prevention and Control

3298. **Polyethylene-lined water holes.** *For. Equipm. Note, FAO* No. *E.*17.58, 1958. pp. 1. *Repr.* from *Timberman* 59 (6), 1958 (39).

3299. MOKEEV, G. A. Primenenie vzryvčatyh materialov pri tušenii lesnyh požarov. **[The use of explosives in forest fire control.]** *Lesn. Hoz.* 11 (4), 1958 (42–5). [Russ.]

Explosives have been used experimentally for > 20 years in the U.S.S.R. to control and localize forest fires. Cartridges of ammonite or other explosive are detonated in lines, creating continuous ditches 2·5–4 m. wide to form fire lines of bare earth. Owing mainly to transport difficulties, the method has only recently been widely applied, but now parachute teams of ca. 10 men with kits of explosives are being increasingly used. Teams and equipment are based at aerodromes (in a state of readiness). The consumption of explosives and the rate and efficiency of work with them, is discussed with reference to experience from operations in the Archangel, Irkutsk, Urals and W. Urals regions in 1957 under widely differing conditions of soil and terrain. The general success of the method is expected to lead to a great increase in its use in the U.S.S.R.

434. Revegetation etc. of Burnt Areas

3300. JAHN, E. Waldbrände in ihrer Auswirkung auf Boden, Bodentierleben und Wiederinbestandsbringung von Beständen. **[The effect of forest fires on the soil, the soil fauna, and the reforestation of burnt sites.]** *Allg. Forstztg.* 70 (3/4), 1959 (27–9). 12 refs. [G.g.]

Discusses, largely on the basis of work by W. Grabherr, the chemical, structural, and biological effects of fires on soils [cf. *F.A.* 18 No. 1250] and the succession of vegetation on burnt sites in alpine regions, where moss communities, after a short interlude of nitrophilous plants, are generally followed by grass communities, leading via *Ericeta* and shrub communities to *Pineta-Ericeta* or *Pinus-Picea* communities, though not all stages are always reached. Where fires have been severe, erosion and karst formation are frequent.

3301. NEILAND, B. J. **Forest and adjacent burn in the Tillamook Burn area of northwestern Oregon.** *Ecology* 39 (4), 1958 (660–71). 18 refs.

A comparison was made of vegetation and microclimate (*a*) inside the only considerable surviving forest stand, and (*b*) on an adjacent area burned in 1945. The shrub and herb layers in (*a*) varied from dense patches to areas with only a few scattered herbs. About twice as many shrub and herb species occurred on (*b*) as on (*a*). In general (*a*) had lower maximum and slightly higher minimum temperatures, slightly higher relative humidity, and higher soil m.c. after 10 days without precipitation. Loss on ignition and amounts of available P were higher in soil samples from (*a*), but pH and available K were similar in (*a*) and (*b*). *From author's summary.*

3302. PRIOR, K. W. **The Balmoral forest fire.** *N.Z. J. For.* 7 (5), 1958 (35–50).

Describes a disastrous fire (Nov. 1955) in a forest of exotic Pines, fire behaviour, damage etc. and discusses its bearing on afforestation policy, lay-out of plantations, management etc. Recommendations are made on lay-out of firebreaks, size of compartments, slash disposal etc.

3303. THOMSON, A. P., and PRIOR, K. W. **Natural regeneration of *P[inus] radiata* following**

the Balmoral forest fire *N.Z. J. For.* 7 (5), 1958 (51–70). 4 refs.

An extremely hot fire in Nov. 1955 [see preceding abstract] destroyed, *inter alia*, some 1470 acres of 28- and 29-year-old *Pinus radiata*. This paper describes the attempts that were made to induce regeneration under the burnt stands, and records the results. Mortality in the seedling regeneration was severe, and various investigations were made to determine its causes, the results of which are recorded and discussed. The following conclusions were reached. (1) By far the greater part of all seed shed after crown fires in *P. radiata* is eaten by birds. At Balmoral 90% of available seed was lost in this way. Poisoning was not effective in conserving seed, but ground scarification was. (2) Scarification improved the distribution of seedlings in terms of stocked quadrat %s by only 9%, but it resulted in a residual stocking of > 2500 seedlings/acre, nearly double the number it would otherwise have been. The high stocking will necessitate early and drastic thinning, but the combined cost of scarifying and thinning should be less than that of planting, and the final crop should be of higher quality. (3) Large losses were caused soon after germination by both birds and noctuid larvae. The sudden build-up of noctuids to epidemic proportions was undoubtedly a fire-induced phenomenon, and bird damage was probably also greater than normal, but further studies should be made of the effect of birds on the regeneration of unburnt stands. (4) Subsequent deaths were caused mainly by frost (>1000 seedlings/acre) though the winter was not particularly severe. (5) Wilt damage in summer was shown to be unrelated to ground temperatures, and lack of soil moisture must be the critical factor. (6) Microtopography was shown to have a marked effect on the early development of seedlings, as had the amount of slash cover. Light slash provides the optimum conditions for survival and development of young *P. radiata*.

435. Benefits of Fire Control. Injurious Effects of Fire

See also No. 3300.

3304. GUNJAŽENKO, I. V. Povyšenie produktivnosti sosnovyh žerdnjakov povreždennyh nizovymi požarami. **[Increasing the productivity of *Pinus sylvestris* pole stands damaged by surface fires.]** *Lesn. Hoz.* 11 (6), 1958 (12–5). [Russ.]

In 1944 a surface fire damaged, in varying degrees, parts of a Pine plantation established by line sowing in 1914 in Belorussia. The microclimatic data, characteristics of the residual stands (e.g. tree size, root length and density, humus content of soil, litter weight etc.), and the volume and financial losses are tabulated for slight, medium, and severe damage, in comparison with undamaged control plots. To restore the damaged stands, a 3-point programme was successfully undertaken: repeated sanitation fellings to remove dying trees; underplanting 2-year Pine in scarified, fertilized soil to increase the stocking; and application of mineral and organic fertilizers to restore fertility.

436. Beneficial Effects of Fire. Uses of Fire in Silviculture and Other Forms of Husbandry

See Nos. 3017, 3019–20.

44. Damage by Harmful Plants. Virus Diseases

441. Weeds

See also Nos. 3082, 3153, 3171–5, 3275, 3322.

3305. **Weed control handbook.** Blackwell Scientific Publications, Oxford. 1958. pp. viii + 245. Price 12*s.* 6*d.*

[Cf. *F.A.* 18 No. 559.] Contains sections on: terminology, classification and formulation of herbicides, with notes on herbicides used in Great Britain; recommendations and information on their use in agriculture, horticulture, forest nurseries (treatment of fallow land, pre-sowing and pre-emergence treatment of seedbeds, and post-emergence treatment of seedbeds and transplant lines, with lists showing tree species resistant, moderately resistant and sensitive to mineral oil, and the weeds controlled), lawns and sports turf, special problems (including the agricultural and forestry use of chemicals for controlling woody weeds), etc.; the application of herbicides; weeds and weed seeds; and approved and new herbicides. Appendices give a glossary of technical terms, a list of common names and chemical abbreviations, and a table showing chemical and physical properties.

3306. ARBONNIER, P. La destruction des graminées par le dalapon. **[Control of grasses by dalapon.]** *Rev. for. franç.* 11 (2), 1959 (138–41 + 1 plate). 5 refs. [F.]

Describes mode of action, techniques and timing of application (chiefly against *Molinia* grass), dosage, costs etc. In the forest of Rambouillet, in a degraded Oak stand, a carpet of *Molinia* was completely eradicated (30 kg. dalapon in 1200 litres water/ha.) without damage to coppice; 20 kg. are thought to suffice in many cases.

3307. KARLBERG, S. Om gräsproblemet vid skogsodling och möjligheterna att lösa det med tillhjälp av kemiska medel. **[The problem of grass in establishing plantations, and possibilities of solving it by using chemicals.]** *Skogen* 45 (24), 1958 (752–3). [Sw.]

In trials, 3-amino 1,2,4-triazole and preparations consisting of substances not easily soluble but with a herbicidal effect, have been successfully used before planting. The latter can be used after planting but amino triazole causes some damage to the plants. Costs are below those for hand weeding.

3308. BÄRRING, U. Några orienterande försök med kemiska medel mot ört- och vedartad vegetation. **[Some exploratory experiments in chemical control of herbaceous and woody plants.]** *Medd. Skogsforskn-Inst., Stockh.* 47 (10), 1958. pp. 66. 47 refs. [Sw.e.*e.*]

A report, in more detail and with a review of the literature, of experiments on woody species previously described [cf. *F.A.* 19 No. 3133], and additional ones on herbaceous plants. Against bracken, only $NaClO_3$ (150–200 kg./ha. sprayed in

plenty of water) and 4, K-2M [MCPA] butyl ester (20 g. active principle in 1 litre of water) were thought promising, though the latter was too dear. High atmospheric humidity appeared to improve the effect of $NaClO_3$. Ammate was ineffective, TCA even stimulating. Neither $NaClO_3$ nor Kalmapan [no specification] was satisfactory against *Spiraea ulmaria* and *Urtica dioica*. *From author's summary.*

3309. SIMPFENDORFER, K. J. **Investigations into the control of bracken fern by weedicides.** *Plantat. tech. Pap. For. Comm. Vict.* No. 5, 1958 (10–9). 11 refs.

None of the treatments tested was really satisfactory for controlling bracken, but $NaClO_3$ at 3 cwt./acre was by far the best.

3310. EDWARDS, M. J., and MONTGOMERY, D. **Chemical control of bracken (*Pteridium aquilinum*).** *Pest Technol.* 1 (5), 1959 (133–5). 7 refs.

Concentrated Borascu (containing 65% B_2O_3), applied dry in early spring at 13–17 cwt./acre, gives satisfactory frond control for 2 seasons, and at 8 cwt. for 1 season. A pelleted combination of 2,4-D and Na borate (7·5% 2,4-D acid and 39·3% B_2O_3) at ⩾ 480 lb./acre gave similar results. Trials are in progress to determine how soon after the treatment young trees may safely be planted.

3311. SUTTON, R. F. **Chemical herbicides and their uses in the silviculture of forests of Eastern Canada.** *Tech. Note For. Br. Can.* No. 68, 1958. pp. 54. Ca. 225 refs.

A review with special reference to the control of hardwoods in the Aspen/Birch/Spruce/Fir forests of boreal Ontario. Part I covers herbicide uses, methods of application, selectivity, types, diluents and additives etc., and Part II the most important weed species. Of these, Alder and Hazel were found to be easy, and Aspen, Birch and Mountain Maple difficult to control. Suggestions for further research are made, and the inclusion of a full account of all potentially important factors in reports on control operations is urged.

3312. MCCONKEY, T. W. **Helicopter spraying with 2,4,5-T to release young White Pines.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 101, 1958. pp. 14. 7 refs.

In 1954 two areas of White Pine reproduction in competition with dense, low-grade hardwoods were sprayed by helicopter in the Massabesic Experimental Forest, S.W. Maine. A 15-acre site (*a*) was sprayed at a rate of 1 lb. and a 30-acre site (*b*) at 3 lb. of 2,4,5-T in 2½ gal. fuel oil/acre. Costs are given. Comparisons between the two treatments were vitiated by differences in stand conditions. Both concentrations killed the hardwood overstorey (mostly Oaks) but on (*b*), where this was sparse, appreciably more of the understorey was killed. Examination in 1956 showed that all Pines had responded to release, basal diam. growth being thrice that of unreleased Pines, and terminal shoot growth also better; on (*b*) serious hardwood competition appeared to be eliminated.

3313. MCCULLY, W. G. **Chemical brush control program.** *Texas Agricultural Progress, College Station, Tex.* 3 (1), 1957 (14–5). From *abstr.* in *Weed Abstr.* 6 (6), 1957 (813). O.R.E.

Recommendations are given for the control of Mesquite, and Post and Blackjack Oak. Frill or stump sprays of 16 lb. acid equivalent (a.e.) 2,4,5-T in 100 gal. oil will control Ash, Black Gum, Elm, Sweetgum, *Platanus* sp., and Water Oak; autumn and winter applications should be made to Blackjack Oak, Hackberry, [Black?] Locust, Post Oak, Red Oak and Sumac; spring or summer applications to *Diospyros* sp. and *Sassafras albidum*. Basal sprays of 8 lb. a.e. 2,4,5-T in 100 gal. oil will control the following if ⩾ 6 in. diam.—*Maclura pomifera*, *Carya aquatica*, *Bumelia lanuginosa*, Hackberry, *Gleditsia* sp., *Carpinus* sp., *Acacia farnesiana*, Mesquite, *Zanthoxylum* sp., *Crataegus* sp., Sumac, *S. albidum*, *Melia azedarach* [?], Willow and *Ilex vomitoria*; 16 lb./100 gal. oil are required for Blackjack, Bur, Post and Red Oaks; 8 lb. monuron or fenuron/100 gal. water as basal spray will control Blackjack and Post Oaks. Soil injection (2 oz. per in. of stem diameter up to 8 in., to underground parts of the tree on opposite sides of the stem) of 8 lb. a.e. 2,4,5-T in 100 gal. oil for Blackjack Oak, *Ulmus alata*, *Gleditsia* sp., *B. lanuginosa* and Post Oak; the same rates of 8 lb. monuron or fenuron in 100 gal. water for Post and Blackjack Oaks.

3314. BORSA, P. Risultati di prove decespuglianti su robinia, rovo, evonimo, olmo e fitolacca. **[Results of brush-control experiments on *Robinia pseudoacacia*, *Rubus* spp., *Euonymus europaeus*, *Ulmus carpinifolia* var. *suberosa* and *Phytolacca decandra*.]** *Notiz. Malatt. Piante* No. 45/46, 1958 (21–30). [It.it.] I.M.I.

Spraying was done in autumn in 2- to 3-year-old brush, using different dosages and mixtures of (*a*) Trioxone Solplant (butyl ester of 2,4,5-T) and (*b*) Fernoxone Solplant (Na salt of 2,4,-D). Results were assessed a year after treatment. Best results were obtained on Robinia by (*a*) at 7 kg./ha.; addition of (*b*) was not an improvement. *Rubus caesius* was resistant to all treatments, but good control was obtained of *R. ulmifolius* by a mixture of 25 kg. (*a*) + 6·6 kg. (*b*) per ha. *Euonymus* proved susceptible to the same dosage and mixtures as *R. ulmifolius*. No positive results were obtained for *Phytolacca decandra*. Good control of the Elm was obtained by a mixture of 50 kg. (*a*) + 6·6 (*b*) per ha. When spraying was done in the spring, good control of Robinia resulted from spraying the whole plant or the basal stem with a solution of 1·5 kg. (*a*) per 100 litres petroleum, and of *Rubus ulmifolius* and *Euonymus* with 3 kg. (*a*) per 100 litres petroleum.

3315. DAWKINS, H. C. **Seasonal effectiveness of arboricides.** *Tech. Note For. Dep. Uganda* No. 8 (58), 1958. pp. 1. 2 refs.

Spraying the dry boles of *Teclea nobilis*, *Trichilia prieuriana*, and *Bosquiea phoberos* (5 of each every month through one year) with butyl 2,4,5-T/2,4-D in a 1/2 mixture at 30% in diesel oil, and estimating crown deterioration at 6-month intervals thereafter, confirmed that dry-season spraying tends to be more effective for *Teclea* but not for *Trichilia* or *Bosquiea*.

3316. HARKER, K. W. **An *Acacia* weed of Uganda grassland.** *Trop. Agriculture, Trin.* 36 (1), 1959 (45–51). 5 refs.

[Cf. *F.A.* 19 No. 1910.] Includes a description of *Acacia hockii*, its growth and development, effect of heat on its seed germination, and bush control experiments with sprays of 2,4-D and mixtures with 2,4,5-T in water and dieseline at various strengths.

3317. IVENS, G. W. **The effects of arboricides on East African trees and shrubs. II. Species of *Brachystegia-Pseudoberlinia* woodland.** *Trop. Agriculture, Trin.* 36 (1), 1959 (52–64). 6 refs.

[Cf. *F.A.* 20 Nos. 1982–3.] Tabulates and discusses the effects, over 34 months, of (1) ring barking (bands 1–2 ft.), (2) frilling alone, and (3) frilling with basal spraying of (*a*) 2,4-D, (*b*) 2,4,5-T and (*c*) 2/1 mixtures of these in diesel oil or (*d*) 2,4,5-T as a water emulsion, on *miombo* stands (28 species, 100 stems/acre, 15–30 ft. high with mean basal diameters of 6–11 in.). Fire passed through the 8-ft. grass 2 months after treatment. Weedone L.V.4 at 4% (w/v) was used in (3*a*), Weedone 2,4,5-T at 1, 2 and 4% for (3*b*) and (3*d*) and Weedone Brushkiller 64 at 1, 2, and 4% for (3*c*). Millilitres of spray per in. diam. varied from 10 to 15. The % of dead trunks fell as diameter increased. The %s of dead stems and dead stems without regrowth after 34 months from (1) and (2) were respectively 63 and 27, and 32 and 21. The same %s for the most effective spraying were 83 and 77 for (3*a*), and 74 and 73 for 4% in (3*d*). The (3*b*) treatment was slightly more effective than (3*a*) or (3*e*). Coppice and sucker regrowth occurred in 20–30% of the stems, including a larger proportion of *Pseudoberlinia* (the second largest and second commonest tree, forming 10% of the stand). The effect of spraying season requires clarification. In view of costs, the chief value of spraying would be for discriminatory and not total clearing.

3318. PUDDEN, H. H. C. **[Control of Eucalypts by 2,4,5-T.]** *Rep. For. Dep. Kenya 1955/1957*, 1958 (17).

Experiments in the eradication of unwanted Eucalypts in timber plantations were continued, mainly on *Eucalyptus saligna*. Spraying stumps with 4% 2,4,5-T in dieseline after coppice cutting was the most successful treatment. Foliage sprays were ineffective with *E. saligna*, *E. microcorys*, and *E. paniculata*, and basal sprays on *E. saligna* at various concentrations almost so. [Cf. *F.A.* 16 No. 3119.]

3319. ROSS, P. **Herbicide control of coppicing in Teak.** *Bot. Gaz.* 120 (1), 1958 (59–61). 7 refs. O.B.D.

Presents the results of experiments on the use of various growth-regulators to prevent coppicing of Teak stumps after thinning in plantations in Trinidad. The Na salt or the butyl ester of 2,4-D in water, the Na salt of TCA, and $Na_2B_4O_7$ were only partially effective. The treatment recommended is, either a 2% solution of 2,4,5-T in an oil carrier, or a concentrated solution of the tri-ethanolamine salt of 2,4-D, sprayed by knapsack sprayer on to the cut surfaces and sides of Teak stumps during the first week after felling. *From author's summary.*

442. Parasitic (Higher) Plants. Epiphytes. Climbers

See also No. 3323.

3320. HAWKSWORTH, F. G., and PETERSON, R. S. **Notes on the hosts of three Pine dwarf mistletoes in northern Colorado.** *Plant Dis. Reptr.* 43 (1), 1959 (109–10). 5 refs. A.P.B.

Notes on the host preferences of *Arceuthobium americanum*, *A. vaginatum* f. *cryptopodum* and *A. campylopodum* f. *cyanocarpum* found on *Pinus contorta*, *P. ponderosa* and *P. flexilis* in Colorado.

3321. ANDREWS, S. R. **Dwarf mistletoe [*Arceuthobium vaginatum*] of Ponderosa Pine in the Southwest.** *For. Pest Leafl. U.S. For. Serv.* No. 19, 1957. pp. 4. 3 refs. [Cf. *F.A.* 16 No. 1882; 18 No. 569.]

3322. GREENHAM, C. G., and BROWN, A. G. **The control of mistletoe by trunk injection.** *Journal of the Australian Institute of Agricultural Science, Sydney* 23 (4), 1957 (308–18). 17 refs. O.R.E.

Discusses earlier tests [cf. *F.A.* 14 No. 418] and describes further investigations on several species of *Eucalyptus* to control mistletoe (especially *Amyema pendula*) by stem injection of 2,4-D into the host. Two dosages were used, and introduced either via many shallow holes, or via a few deep ones. The treatment sometimes caused a temporary partial defoliation of the hosts, and ca. 5% of the host trees died, but a 70–100% kill of mistletoe was achieved. A second treatment two years later was found to kill ca. 50% of the mistletoe surviving. In all, trials have been made on 8 species of *Eucalyptus*, on 7 of which satisfactory control at an economic cost was obtained.

443. Fungi and Bacteria

See also Nos. 2830–3, 3071, 3273–5.

3323. SPAULDING, P. **Diseases of foreign forest trees growing in the United States; an annotated list.** *Agric. Handb. U.S. Dep. Agric.* No. 139, 1958. pp. 118.

Arranged alphabetically under pathogens (viruses, bacteria, fungi, and mistletoes separately) with a host index of the diseases.

3324. STRONG, F. C. **Nature and control of anthracnose of shade trees.** *Arborist's News, Wooster* diseases. For Elm leaf-spot, Sycamore [*Platanus* 22 (5), 1957 (33–9). L.S.

Discusses true anthracnoses and other leaf diseases. For Elm leaf-spot, Sycamore [*Platanus* spp.], Oak and Maple anthracnoses, Walnut leaf-spot and Horse-Chestnut leaf-blotch, organic Hg compounds, particularly Puratized Agricultural Spray, are recommended as colourless alternatives to Bordeaux mixture etc. For Hawthorn leaf-blight, Acti-dione at 20 p.p.m. is recommended. Affected trees should be given complete fertilizer treatments.

443.2. Diseases of Seed and Seedlings; Damping Off etc.

3325. NOBLE, M., TEMPLE, J. DE, and NEERGAARD, P. **An annotated list of seed-borne diseases.** Commonwealth Mycological Institute, Kew. 1958. pp. 159. Price 20*s*.

Arranged under families of the hosts, with an index to pathogens, and indexes to common and Latin names of hosts, which include *Acer* spp., *Alnus* spp. *Araucaria excelsa*, *Betula* spp., *Chamaecyparis* sp., *Fraxinus* spp., *Larix* spp., *Picea sitchensis*, *Pinus* spp., *Quercus* spp., *Thuja* spp., *Ulmus americana* and *U. pumila*.

3326. SCHÖNHAR, S. Bekämpfungsversuche gegen Keimlingsfäule mit verschiedenen Fungiziden. **[Trials with various fungicides to control damping off.]** *Forst- u. Holzw.* 14 (3), 1959 (52–3). 7 refs. [G.]

Pinus sylvestris seeds were grown in a glasshouse in pots of (*a*) compost soil and sand, and (*b*) compost soil and sand and peat. Twelve different fungicides were applied in suspension to control damping off by *Pythium* sp., *Phytophthora cactorum* and *Rhizoctonia solani*. In both (*a*) and (*b*), captan, zineb, ferbam, ziram and TMTD [thiram] gave more than twice as many healthy plants as did controls. The other fungicides gave slightly better results than controls, but Rhodandinitrobenzol in (*a*) and (*b*), and maneb in (*b*), gave worse results than controls.

3327. GRIFFIN, D. M. **Influence of pH on the incidence of damping-off.** *Trans. Brit. mycol. Soc.* 41 (4), 1958 (483–90). 19 refs. O.B.D.

Using *Beta vulgaris*, *Brassica campestris*, *Picea sitchensis* and *Pinus contorta* as hosts and *Pythium ultimum* as parasite over a wide range of soil reactions, it was ascertained that the main factor affecting changes in incidence of damping-off with change in soil pH is the vigour of the host as expressed in growth rate during the susceptible period. Three of the 4 host species showed a strong negative correlation between incidence of disease and growth rate. On the other hand the rate of growth of the pathogen over the pH range investigated appeared to be of little importance.

3328. JANČAŘÍK, V., and UROŠEVIČ, B. Hromadný výskyt (houby *Coniothyrium quercinum* (Bonord.) Sacc.) na semenáčcích dubu červeného (*Quercus rubra* L.). **[Serious *C. quercinum* attack on seedlings of *Q. rubra*.]** *Abstr.* in *Preslia* 30 (4), 1958 (370–1). [Cz.e.] E.M.B.

C. quercinum was isolated and cultured from dead and dying Oak seedlings at Hradec Kralové, Czechoslovakia, in hot dry weather in June, 1957. The pycnidia and conidia of the fungus are described.

3329. FANG, C.-T., *et al.* **[Experiments on the control of the stem rot disease of *Ginkgo* caused by *Macrophomina phaseoli*.]** *Acta Phytopathologica Sinica* 2 (1), 1956 (43–54). [Chin.e.] I.M.I.

M. phaseoli, which causes stem rot of *Ginkgo* [*biloba*] and other forest trees in the nursery, is favoured by hot dry weather, with an optimum temperature of 32° C. The infection travels through unlignified seedling tissues that have been injured by high soil temperatures. An accurate forecast of the disease can be made on the basis of temperatures and the amount of rain during June, July and August. The disease has been successfully controlled by proper shading and mulching of the seedbed during the critical period or by applying organic fertilizers before sowing. Attempts to control the disease by soil disinfectant failed. *From authors' summary.*

443.3. Diseases of Older Stages

See also No. 3528.

3330. KRSTIĆ, M., MARINKOVIĆ, P., and ŠMIT, S. Prilog poznavanju mikoflore na topolama u Srbiji. **[Notes on the mycoflora of Poplars in Serbia.]** *Topola, Beograd* No. 6, 1958 (437–46). 4 refs. [Serb.f.]

Lists, with short morphological descriptions, 23 species of fungus isolated from leaves, bark and wood of Poplars during field studies in 1956–57; attention is drawn to the species causing most damage.

Stem, Butt and Root Rots; Root Diseases

See also No. 3848.

3331. POSPÍŠIL, J. Problém zdravotního stavu osiky. **[The health of Aspen.]** *Sborn. čsl. Akad. zeměd. (Lesn.)* 4 (10), 1958 (831–8 + 3 plates). 14 refs. [Cz.cz.russ.g.]

Presents a diagram and table showing the proportion of healthy and diseased Aspens in Bohemia, Moravia and Slovakia. The fungus *Phellinus igniarius* f. *tremulae*, causing heart rot, the most dangerous pathogen on Aspen, is not very widespread, and resistant individuals still occur in the forest, although Aspen had previously been removed as much as possible. These should be used for large-scale propagation. *From author's summary.*

3332. CHAO, C.-T., and TS'AI, T.-M. **['Water heartwood' of White Birch in N.E. China.]** *For. Sci., Peking* 1958 (2), (215–22). 15 refs. [Chin.chin.e.]

Describes and discusses a type of reddish-brown, discoloured heartwood, sometimes with light yellow rings, prevalent in N.E. China in *Betula platyphylla*, particularly on slopes, and found even in trees only 10 years old. Infection appears to start mainly from wounds on the lower part of the stem, its extension upward and radially increasing with age. Fungi isolated from this 'water heartwood' included *Torula ligniperda*, *Pseudomonas* sp. and *Fusarium* sp., but the relation between these fungi is not clear. *From authors' summary.*

3333. **Protection against insects and fungal disease.** *Rep. For. Dep. Kenya 1955/1957*, 1958 (11).

A survey was begun to establish the relationship between game damage and insect or fungal attack in plantation trees. Scarring of the butt log by buffalo or elephant is the usual type of damage, but monkeys can also be destructive. In a plantation of *Cupressus macrocarpa* frequented by Sykes monkeys, extensive heart rot has been found at a

height of ⩾ 20 ft. above ground level, resulting from the barking of trees by these monkeys.

3334. KILIAS, G. Was ist bei der Aufforstung von Ödland mit Kiefer zu beachten? **[What should be taken into consideration when afforesting non-forest soils with Pine?]** *Dtsch. Landwirtsch.* 10 (1), 1959 (43–7). [G.]

Studies were made at the Eberswalde Institute into the causes of a disorder ('*Nadelholzsterbe*') of Pine growing on waste and old agricultural land. The disorder is characterized by checking at 10–20 years of age, followed frequently by mortality, spreading out from focal points. *Fomes annosus* is always present. Unfavourable soil conditions are not responsible, since well developed root systems were found in pole-size trees. Dying-off of roots, however, was found in trees between 10 and 20 years old. Many horizontal roots had died back to the rootstock; in others the disorder had been isolated by resin exudations, and auxiliary roots had formed. In slightly affected trees the development of the root system is disturbed but not destroyed. In badly affected trees both horizontal and vertical roots die off, leaving the tree with a single root; resinosis of the lower part of the rootstock may take place and the tap-root may also die. Three growth stages may be distinguished in affected, but surviving trees: (1) early fast growth up to ca. 15 years, (2) a falling-off between 15 and 60 years, and (3) recovery and very rapid growth from 60 years onwards. It is suggested that the disease is caused by *F. annosus* and that it has a different behaviour pattern on non-forest soils, because of the lack of competing and antagonistic fungi and bacteria. It is therefore better to use resistant broadleaved species, such as Birch and Poplar, as pioneers on non-forest soils. If it is necessary to plant Pine, wide spacing (ca. 1·5 × 1·5 m.) should be adopted in order to reduce root competition and the possibility of infection spreading through the roots. In slightly affected stands gaps should be filled with resistant species. Little can be done with seriously affected stands, except underplanting with resistant trees and, in order to take advantages of the later quick growth, lengthening the rotation to ca. 140 years.

3335. LADEFOGED, K. Undersøgelser over forbindelsen mellom hugststyrke, roddød og råddannelser i rødgran. **[Research on the relations between felling grade, root death and rot in Norway Spruce.]** *Dansk. Skovforen. Tidsskr.* 44 (1), 1959 (5–53). 29 refs. [Dan.]

The study was made in 1955, in a 60-year plantation, badly damaged by rot and in process of clear-felling; it had been thinned lightly until 1940, when it was heavily logged, removing trees of predetermined dimensions to produce poles; from 1946 to the clear-felling in 1955, relatively large amounts, including a small number of dying trees, were removed every year. The timber volume in 1955, 367 cu.m./ha., was roughly that expected for Spruce of its age and site class. A study of the soil, from 1946 onward, suggested that in the period up to 1940 mor formation was taking place over the whole area; in 1940 mor formation probably stopped in some parts, and in 1946 there were certain places where activation of the mor was beginning, a process that was accelerated by the later fellings. The ground flora increased both in amount and in variety of species from 1946. A study of the root systems, after clear-felling, showed that the surface roots were healthy, with a large number of roots 5–15 mm. thick, i.e. new within the last 5–10 years, but that only 24% of the root systems examined had healthy deep roots; in the remainder, most or all roots below a certain depth were dead, and examination of the root growth rings showed that they had died during the last 10 years. The most probable reason for death is lack of soil O, caused by increased water content, greater O consumption in the mor layer, and clogging of the pore spaces in the lower layers by humus particles from the mor. Lack of deeper roots meant that many trees were killed by the 1955 drought. A study of the stumps showed that many of the trees had been attacked by rot, probably chiefly *Fomes annosus*. Infection had been mainly through bark wounds near the root collar or on surface roots (58%) or by dead roots (23%); infection through contact between root systems or damage to the roots by stones was comparatively rare. Rot entering through bark injuries had usually spread only 5–10 cm. from the wound and only reached a height of ½–1 m., rarely 2 m., in the stem. Rot entering through dead roots was much more extensive, usually starting in the heartwood, and reaching 2–4 m. height in the stem. To avoid *Fomes* attacks, thinning and felling in such a way that soil conditions and root development remain constant throughout the life of the plantation are recommended; possible methods are light thinning throughout, or early heavy thinning combined with wide plant spacing to prevent too active mor formation in the early stages.

3336. NEWHOOK, F. J. **Mortality of *Pinus radiata* in New Zealand.** *Abstr.* in *Proceedings, 24th Session Canadian Phytopathological Society, Vancouver 1957* No. 25, 1957 (16). I.M.I.

In a disease causing heavy losses in *P. radiata* shelterbelts in many districts in the N. island of New Zealand, groups of mature trees die rapidly in spring and early summer following abnormally wet winters, apparently from a wilt after attack by *Phytophthora cinnamomi* on absorbing rootlets [cf. *F.A.* 18 No. 1801]. The fungus was present in 25–63% of soil samples from affected hedgerows but in only 0–6% from healthy hedgerows. Grid sampling showed that the fungus is absent or rare in open fields but highly concentrated in the fibrous-root zone of the trees. *P. cinnamomi* is present in some of the major Pine plantations in New Zealand, and an apparently new species of *Phytophthora* has also been isolated from them. These fungi may account for some of the widespread mortality in N. Island Pine plantations—formerly attributed to competition and suppression, since many dominant trees have also died.

3337. RAABE, R. D. **Some previously unreported non-woody hosts of *Armillaria mellea* in California.** *Plant Dis. Reptr.* 42 (9), 1958 (1025). 3 refs. A.P.B.

Amaryllis vittata, Fuchsia hybrida, Impatiens oliveri, Pelargonium domesticum and *P. peltatum.*

3338. THOMAS, G. P. **Studies in forest pathology. XVIII. The occurrence of the Indian paint fungus *Echinodontium tinctorium* E. & E., in British Columbia.** *Publ. Div. For. Biol. Dep. Agric. Can.* No. 1041, 1958. pp. 30. 29 refs.

The distribution and abundance of *E. tinctorium* appear to be influenced directly, (1) by the nature of the summer climate of particular areas, and (2) by the inherent susceptibilities to infection of its different hosts. Factors that influence the fungus indirectly include altitude, topography, and the silvicultural characters of individual trees and trees of different species.

3339. WAGENER, W. W., and BEGA, R. V. **Heart rots of Incense-Cedar [*Libocedrus decurrens*.]** *For. Pest Leafl. U.S. For. Serv.* No. 30, 1958. pp. 7. 3 refs.

The most important of these is a pocket dry rot caused by *Polyporus amarus.* Over 30% of the volume of standing Incense Cedar in California is lost through this rot. Extent, development and symptoms of the decay are described.

3340. OGANOVA, È. A. Bolezni stvolov jasenja v zavisimosti ot lesorastitel'nyh uslovij. **[Stem diseases of Ash in relation to forest growth conditions [in Oak/Ash stands in the Tellerman Forest, Voronezh].]** *Lesn. Hoz.* 11 (6), 1958 (41–4). [Russ.]

A 'false canker' (canker-rot) caused by *Endoxylina stellulata* is found, usually on young trees, in both plantations and natural forest, mainly where conditions are not good for Ash, e.g. on soils with a tendency towards solonetz formation. It is mentioned that a conidial stage of the fungus was found, with orange spore masses formed in the bark, and has been named *Libertella fraxinea* sp. nov. Bacterial canker is found usually in stands on grey and dark-grey soils, where conditions for Ash are good. Partial destruction of forest cover by incautious thinning and cutting of the underwood has been found to promote cankering. Damage by stem rots such as *Fomes fomentarius, Polyporus hispidus,* etc., and butt rots such as *Armillaria mellea* and *Lentinus tigrinus,* is also discussed. In growing Ash, dry, S. slopes, saline soils, and too high a proportion of Ash in the stand should be avoided.

3341. WALTERS, N. E. M. ***Poria healeyi* sp. nov., the causal fungus of yellow straw rot in Jarrah (*Eucalyptus marginata* SM.).** *Repr.* from *Trans. Brit. mycol. Soc.* 41 (1), 1958 (95–8 + 1 plate). 3 refs.

Describes *P. healeyi,* cause of decay in the W. Australian Jarrah, but fruiting readily only in eastern Victoria, where its principal host is *E. regnans. From author's summary.*

Wilts, Diebacks etc.

3342. **Elm disease, *Ceratostomella ulmi.*** *Leafl. For. Comm., Lond.* No. 19 (rev.) 1958. pp. 7. Price 9*d.*

Concludes that the risk of the disease in Britain is now low enough to suggest that planting of Elms is justified, except as avenues, where the loss of one tree can damage the whole lay-out.

3343. CAMPANA, R. **Elms susceptible to Dutch Elm disease and Elm phloem necrosis.** *Trees Mag., Ohio* 19 (1), 1958 (6, 19).

Notes on examples of natural infection in supposedly resistant species and varieties, e.g. *Ulmus carpinifolia, U. pumila,* and the 'Augustine Ascending Elm' (a horticultural variety of *U. americana*).

3344. HUSAIN, A., and DIMOND, A. E. **The function of extracellular enzymes of Dutch Elm disease pathogen.** *Proceedings of the National Academy of Sciences of the United States of America, Chicago* 44 (6), 1958 (594–601). 20 refs. O.R.S.

The full version, with numerical data, of a paper already noticed in abstract form [see *F.A.* 20 No. 726].

3345. FRITCH, K. C., SCHWARTE, M. K., and MCNABB, H. S., JR. **Observations on the effect of logging on the spread of Oak wilt in the Brayton memorial forest, Iowa.** *Proc. Iowa Acad. Sci.* 64, 1957 (110–2). 2 refs. L.S.

Forest inventories in 1951 and 1956 on ca. 40 acres of mixed Oak spp., including a 10·6-acre control plot, showed an average mortality of 0·710 trees/acre/year on a plot with an annual felling cycle and 0·811 trees/acre/year in the unlogged control plot, indicating that no significant correlation exists between spread of Oak wilt and logging operations. [Cf. *F.A.* 16 No. 4248.]

3346. GRISWOLD, C. L. **Transmission of the Oak wilt fungus by certain woodland-inhabiting Drosophilidae.** *J. econ. Ent.* 51 (5), 1958 (733–5). 4 refs.

Transmission from fresh, sporulating mats to fresh xylem wounds on healthy Oaks was effected in 11 cases with 5 of the 10 species of *Drosophila* tested. Although the conditions required—simultaneous occurrence of mats and fresh wounds are possibly rare in nature—these insects must be considered potential vectors of the fungus. [Cf. *F.A.* 18 No. 582.]

3347. STRUCKMEYER, B. E., KUNTZ, J. E., and RIKER, A. S. **Histology of certain Oaks infested with the Oak wilt fungus.** *Phytopathology* 48 (10), 1958 (556–61). 23 refs.

A study, supported by photomicrographs of fungal development and changes in the cells of the host (proliferation and collapse of invaded ray cells), in naturally and artificially infected *Quercus ellipsoidalis* and artificially infected 2-year-old *Q. virginiana.* Some trees of *Q. ellipsoidalis* that were infected and wilted in the autumn, produced a partial flush of leaves in the following spring and laid down healthy early wood, but by the end of June the new foliage had wilted and the early wood had become infected.

3348. BART, G. J., and YOUNG, H. C. **White Oak resists wilt fungus.** *Trees Mag., Ohio* 19 (1), 1958 (14).

White Oaks are more resistant to this disease than are Red or Black Oaks, and it has been suggested

that obstructions in the water vessels of White Oak stems serve as 'locks' which limit movement of the fungus. To test this theory an experiment was set up at Ohio Agricultural Experiment Station, to determine how fast the wilt fungus moves in White Oaks (*a*), compared with Red Oaks (*b*). Trees 10–12 ft. high were inoculated by placing spores in small cuts either (1) in the roots or (2) just below the highest branch. There was little difference in initial rate of movement, but at the end of 42 days the fungus in method (1) had reached a maximum height of 174 in. in (*b*) and only 15 in. in (*a*), and in method (2) a maximum downward movement of 101 in. in (*b*) and 19 in. in (*a*). Most of (*b*), but none of (*a*), wilted during the 42 days. Thus in White Oak the wilt fungus is definitely limited in its movement, which may be considered as a type of resistance. The reason for this limited movement, however, cannot be only the natural mechanical obstructions in the White Oak vessels. This was demonstrated by the equal ease with which a known concentration of spores suspended in water could be drawn through stem sections of (*a*) and (*b*).

3349. SCHOENEWEISS, D. F. **The use of systemic chemicals in Oak wilt chemotherapy and their effect upon disease development.** *Abstr. of thesis*, in *Dissert. Abstr.* 19 (4), 1958 (653). O.R.S.

Fourteen chemicals were applied by foliar spraying, soil drenching or bole injection. Vancide 51 applied by bole injection was the only one that significantly delayed the onset of symptoms. Acti-dione (cycloheximide) and four of its derivatives were highly phytotoxic as bole injections: Phix and Acti-dione caused light leaf scorching as foliar sprays, and griseofulvin and Monsanto Z-2296 were phytotoxic as soil drenches. The effectiveness of the systemics in the field was not related to their toxicity to the Oak-wilt pathogen in culture. Microtome sections showed that tylose formation in trees with terminally-inoculated branches is more rapid and extensive in Black than in White Oaks. Bands of open vessels, formed outside bands of plugged vessels during the growing season in which symptoms appeared, were observed in sections from branches of diseased White Oaks. An annual ring of xylem vessels was formed outside the ring of plugged vessels in a Pin Oak injected with Vancide 51; the tree remained alive for at least 1½ years after inoculation and wilt symptoms were similar to those of White Oak in which morphological resistance was found. A modified bole injection method was superior to the foliar spray or soil drench methods for introducing systemic chemicals.

Cankers, Stem Rusts etc.

See also Nos. 2795, 3168, 3340.

3350. WESTBURY, J. **New hope against plant diseases?** *B.C. Lumberm.* 42 (11), 1958 (31).

In a 4-year test on 20-year Western White Pine in Idaho, of the effects of the antibiotic Acti-dione on blister rust, it was found that by pruning infected branches and partially excising main stem cankers and treating cut surfaces with a single application of Acti-dione, > 80% of the trees were freed of the fungus. Improved methods have increased canker control of stem cankers to 99%. Infection rate in young stands runs as high as 80%. [Cf. *F.A.* 19 No. 614.]

3351. GUILKEY, P. C., RUDOLPH, V. J., and SHEPPARD, G. **Effects of sweetfern rust on the growth of young Jack Pine in northern Lower Michigan.** *J. For.* 56 (12), 1958 (900–3). 3 refs.

Height and diameter measurements on 15-year plantation-grown Jack Pine showed no significant difference between the growth of healthy trees and those infected by *Cronartium comptoniae*. At 15 and 16 years no mortality had resulted and no significant difference was found in the incidence of infection between thinned and unthinned plots. The effect of the rust on radial growth is limited to the part of the stem in the immediate area of the canker, but the exposed dead wood may serve as an entrance for wood-rotting fungi. Observations will be continued.

3352. JACKSON, L. W. R., and PARKER, J. N. **Anatomy of fusiform rust galls on Loblolly Pine.** *Phytopathology* 48 (11), 1958 (637–40). 10 refs.

A study of fungal growth and host reactions in 2- to 3-year-old branch galls on 7-year-old Pines. In young twigs, hyphae ramified freely in the intercellular spaces of the cortex; in older galls they advanced radially to a depth of 2–3 rings. No late wood formed in the annual rings of the galls. All tissues in the bark increased. Cells in wood rings were larger and more numerous, tracheids were smaller, and number of vertical resin ducts increased. Growth-regulator influences of the fungus were seen in the formation of periderm barriers (retarding but not inhibiting the progress of the fungus) and the earlier formation, after dormancy, of new tracheids in front of and in the vicinity of leading hyphae. Older galls were frequently inhabited by a larva of the family Eurytomidae.

3353. **Cypress canker in Tasmania.** *Tasmanian Journal of Agriculture, Hobart* 28 (2), 1957 (168–9). I.M.I.

A canker caused by the fungus *Monochaetia unicornis* has been causing Cypress dieback in windbreaks and hedges, the most susceptible species being *Cupressus macrocarpa*, *C. sempervirens* and *Chamaecyparis lawsoniana*. It develops gradually, with branches dying singly. The bark of infected twigs and branches develops cracks which exude gum and may sometimes be associated with swellings. If detected early enough, the infected branch can be cut out completely and the wound trimmed and covered with a protective coat of paint, but this is not practicable in extensive plantations. Two species, *Cupressus benthami* and *C. torulosa*, are resistant to the canker and are suitable alternative windbreak species if soil and climatic conditions are favourable.

3354. MORIONDO, F. Una nuova malattia dell'ontano in Toscana. **[A new disease of Alder in Tuscany.]** *Ital. for. mont.* 13 (5), 1958 (204–7 + 12 photos). [It.it.f.]

The disease, which has been found on *Alnus glutinosa*, *A. incana* and *A. cordata*, is characterized by bark necrosis which may spread to the wood, form large cankers, and kill the tree. The lesions are described and illustrated in detail. Experiments are to be made in inoculation with various fungi isolated from the diseased tissues, but present indications are that the pathogen is a bacterium.

3355. CALDARELLI, A. Un nuovo contributo per la lotta e la cura del cancro della corteccia del castagno (*Endothia parasitica*). **[A new contribution to the control and cure of *E. parasitica* canker of Chestnut.]** *Monti e Boschi* 9 (12), 1958 (642–7). 2 refs. [It.e.f.]

Promising results have been obtained by spraying the boles of diseased trees with Sancadico (a compound patented by Sig. di Costanzo of S. Arpino, Naples). Treated trees put out fresh healthy foliage and bark necrosis was halted. The constituents of Sancadico are secret.

3356. TORRES JUAN, J. Enfermedad de las 'escobas de bruja' en las encinas. **[Witches' brooms on Oak.]** *Bol. Serv. Plagas for., Madrid* 1 (2), 1958 (119–22). [Span.]

Describes briefly the witches' brooms caused by *Taphrina kruchii* on *Quercis ilex* and *Q. coccifera*, and control measures, both mechanical and chemical.

3357. SILVERBORG, S. B. ***Eutypella* canker of Norway Maple [*Acer platanoides*].** *Arborist's News, Wooster* 21 (10), 1956 (75–6). 1 ref. L.S.

A first report of a canker caused by *E. parasitica* (common on *A. saccharum* and known on *A. rubrum*) on a street tree of *A. platanoides* in Syracuse, N.Y.

Foliage Diseases

3358. GAMBOGI, P., and VERONA, O. Presenza in Italia di *Pestalotia populi-nigrae* Sawoda et K. Ito, causa di una malattia ('shoot blight') del pioppo. **[The occurrence in Italy of *P. populi-nigrae*, cause of shoot blight of Poplar.]** *Ann. Sper. agr.* (*n.s.*) 12 (4), 1958: suppl. pp. i–iii. 2 refs. [It.it.e.] C.G.B.

The fungus described by the first author as a new species and named *Pestalotia lignorum* [cf. *F.A.* 19 No. 1083] has now been identified with *P. populi-nigrae* [cf. *F.A.* 13 No. 433].

3359. MÜLLER, E., and BAZZIGHER, G. Über einen für die Alpen neuen *Pinus*-Schädling. **[An injurious Pine fungus new for the Alps.]** *Schweiz. Z. Forstw.* 109 (12), 1958 (770–2). 3 refs. [G.]

The fungus *Neopeckia coulteri*, known from Western America and the Carpathian mountains, but not hitherto from Central Europe, is reported from Arosa (Grisons) on *Pinus mugo* var. *pumilio*. The microscopic characters distinguishing it from *Herpotrichia nigra*, which it otherwise resembles, are described.

3360. SPERBER, G. S. Strobennadelschütte. **[*Pinus strobus* needlecast caused by *Lophodermium brachysporum* [*Hypoderma desmazierii*].]** *Allg. Forstzeitschr.* 14 (1), 1959 (9–11). 5 refs. [G.]

Reports observations in the Northern Spessart (Bavaria), where the disease particularly affects 10- to 20-year-old natural regeneration under (pure or mixed) *P. strobus* stands. Plantations and natural regeneration in the open were not affected. The disease, whose symptoms are described, causes dieback of the terminal shoot, leading, with repeated infections, to distorted, bushy growth and, where competition from other shade-bearing species is keen, to death. Silvicultural measures of control are discussed. [Cf. *F.A.* 14 No. 2411.]

Other Diseases caused by Fungi or Bacteria

3361. MATTHEWS, F. R., and MCLINTOCK, T. F. **Effects of fungicides on pollen germination of Slash and Longleaf Pine.** *Res. Note Stheast. For. Exp. Sta.* No. 122, 1958. pp. 2. 1 ref.

Of 4 fungicides tested at 2 or 0·2 lb. (or (pints)/100 gal. water in connexion with *Cronartium strobilinum* control, Puratized Agricultural Spray (an organic mercurial) was 100% lethal. Captan and Basi-cop (tri-basic Cu sulphate) markedly inhibited germination, but Ferbam actually stimulated it, the higher concentration being better on Longleaf, the lower on Slash [cf. *F.A.* 18 No. 2499 for effect of Fe]. Whether Ferbam is effective against the fungus is still under investigation.

444. Virus Diseases

See also Nos. 3323, 3529.

3362. POZDĚNA, J. Serologická diagnosa virosy smrku. **[Serological diagnosis of the virus disease of Spruce.]** *Abstr.* in *Preslia* 30 (4), 1958 (366). [Cz.e.] E.M.B.

The virus was found to have antigenic properties. With needle-tissue extracts, the serological reactions were unfavourably influenced by the acidity of the extract and the presence of tannins. The pH of the antigen was not decisively important in preparing the antiserum, but the pH of the extract was decisive for the serological reaction. [Cf. *F.A.* 14 No. 3105.]

3363. ČECH, M., and KRÁLÍK, O. O tyčkovitých částicích doprovázejících virosu smrku (*Picea excelsa*). **[Rod-shaped particles accompanying virus disease in *P. abies*.]** *Abstr.* in *Preslia* 30 (4), 1958 (366). [Cz.e.] E.M.B.

Rod-shaped particles, 22 mμ in diam., were found by electron microscopy in needle extracts from Spruce attacked by virus, but not in those from healthy Spruce.

45. Damage by Animals

451. Mammals

See also Nos. 2737–8, 3333.

3364. MASON, R. **Foods of the Australian opossum (*Trichosurus vulpecula* Kerr) in New Zealand indigenous forest in the Orongorongo Valley, Wellington.** *N.Z. J. Sci.* 1 (4), 1958 (590–613). 4 refs.

[Cf. *F.A.* 14 No. 467.] Stomach analyses in 1946–47 showed a variety of foods, mainly vegetable, especially leaves with the addition of flowers in

summer and fruit and seed in autumn. Species eaten included *Metrosideros robusta*, *Nothopanax* spp., *Leptospermum* sp., *Hedycarya arborea*, *Coriaria arborea* and *Elaeocarpus dentatus*. Field and enclosure experiments showed that many species, including *Laurelia novae-zelandiae*, not found in the stomachs, were damaged; but *Podocarpus ferrugineus*, *P. totara*, *Dacrydium cupressinum*, *Knightia excelsa*, and *Nothofagus* spp., were rarely eaten though freely available.

3365. PETROVIĆ, N. Stetni glodari u topolicima. **[Rodents causing damage to Poplar stands.]** *Topola, Beograd* No. 6, 1958 (469–75). 8 refs. [Serb.]

Rodents destructive to the bark of Poplar trees in the Danube and Tisa valleys are *Arvicola terrestris* and *Microtus arvalis*. A rapid increase in their population has occurred recently, as natural enemies are few. The damage is caused primarily after floods and during winter when food is scarce. Suggestions are made for control by poison bait.

3366. BRAMBELL, F. W. R. **Voles and field mice.** *Leafl. For. Comm., Lond.* No. 44, 1958. pp. 11. 5 refs. Price 1*s*.

Describes the appearance, life history, habits, and damage caused by the short-tailed vole (*Microtus agrestis*), the bank vole (*Clethrionomys glareolus*), and the long-tailed field mouse (*Apodemus sylvaticus*).

3367. SCHINDLER, U. Wie wirken sich die Flächenbegiftungen gegen Erdmäuse auf die mit ihnen zusammenlebenden Kleinsäuger aus? **[The effect on associated small mammals of plot-poisoning for control of *Microtus agrestis*.]** *Forst- u. Holzw.* 14 (2), 1959 (26–8). 8 refs. [G.]

[Cf. *F.A.* 18 No. 3048.] Poisoning trials on areas up to 10 ha., spraying with 3·5–5 litres toxaphene, or 1–1·2 litres endrin-emulsion/ha. against *M. agrestis*, reduced the original populations of *Apodemus sylvaticus* and *A. flavicollis* by only 20–30% (max. 50%), of *Clethrionomys glareolus* by 0–20% (max. 30%), and of *Sorex araneus* by 0–30% (max. 50%). Different habits, particularly feeding habits, are held to account for the relative resistance of these species compared with *M. agrestis*.

3368. JOKELA, J. J., and LORENZ, R. W. **Mouse injury to forest planting in the prairie region of Illinois.** *J. For.* 57 (1), 1959 (21–5). 3 refs.

Reports observations of mouse damage, principally by *Microtus ochrogaster*, to young plantations of 28 different tree species. Ash, Cottonwood, Douglas Fir, Larch, Osage-Orange, Tulip Tree and Southern Pines (except Loblolly) were severely injured on one or both of the sites examined. A susceptibility rating of species is, however, difficult to draw up, because of the variable nature of injury with location and time. Injury to Pine or hardwoods during the first winter after planting generally resulted in death. Mortality in older Pines was confined to those trees with > 75% of their stem circumferences girdled at ground level. Dieback of established hardwoods from mouse injury was usually followed by sprouting. Growth reduction was most pronounced on injured trees in the first growing season after the damage. Poisoning, to be effective, should be done before the cold weather.

3369. HOOVEN, E. **Deer mouse and reforestation in the Tillamook Burn [N.W. Oregon].** *Res. Note Ore. For. Lds. Res. Cent.* No. 37, 1958. pp. 31.

An animal-ecological study in connexion with reforestation with Douglas Fir [cf. *F.A.* 18 No. 2783], describing methods of trapping, marking and evaluation, and discussing population densities, seasonal fluctuations etc. of *Peromyscus maniculatus rubidus* and other small mammals. There was little difference between plots sown with tetramine-treated and untreated seed. Ca. one-third of the mice caught were unmarked, suggesting continuous movements within the population. It is recommended that baiting for rodent control, if initially done in September or October, be repeated at or near the population peak in November.

3370. BREWSTER, R. H. **What's new in rabbit repellents?** *Amer. Nurserym.* 108 (9), 1958 (13, 45–6).

Discusses repellents based on trinitro-benzene aniline, thiram, methocel, hexadecariol-ethanol etc., giving trade names and/or manufacturers; lists native and ornamental trees and shrubs, frequently, sometimes or rarely eaten; and discusses other methods of protecting nurseries, e.g. by trapping or removal of cover.

3371. STRANDGAARD, H. Kemisk beskyttelse af nåletræskulturer mod vildtbid. **[Chemical protection of conifer plantations against browsing by game.]** *Dansk Skovforen. Tidsskr.* 43 (11), 1958 (559–78). [Dan.dan.]

In preliminary experiments in 1956–57 only two (Diana Skovtjære and Spangol V) of the 4 chemicals tested were considered sufficiently effective to be used in larger-scale experiments in 1957–58. In these later experiments the chemicals were tested in 4 areas carrying large numbers of roe deer and some hares, probably not very numerous; red deer were also present in one area. Spangol V gave satisfactory protection, without damaging the plants. Diana Skovtjære was less satisfactory in areas carrying large stocks of game and caused some damage; however, it is considered suitable for use in the less well-stocked areas, and is cheaper than Spangol V.

3372. KROLL, M. Wildschaden an feldschützenden Anpflanzungen und seine Abwehr. **[Game damage in field shelter plantings and its control.]** *Forst u. Jagd* 8 (9), 1958 (392–7). [G.]

Contains a table showing separately, in 4 or 5 grades, the amount of browsing, rubbing, breaking, and barking done by roe deer, hares and rabbits to 103 woody species and 32 orchard varieties, exposed as cut branches (4 replications, 2 winters). Control measures are critically reviewed. Chief recommendations include: reduction of game to sub-economic damage level; providing (by sowing forage and planting shrubs) a summer feed and a balanced winter ration (hays, roots, seeds); planting 1% of Sallow and Elder as distractions; wire netting, as the best fencing; a mixture of equal parts carbide sludge/ox blood/loam as a highly effective and non-phytotoxic repellent; Vinidur [? plastic] sleeves to protect slender stems. Larch and Douglas Fir are

protected from rubbing by stakes or by attaching 3 tin cans to each plant; young conifers by glass-wool swathing.

3373. **Protection against animals.** *Rep. For. Dep. Kenya 1955/1957*, 1958 (10–1).

Extensive damage is caused to tree crops, especially to *Cupressus* plantations, by elephant and buffalo. No artificial barrier proved completely effective against elephant, but careful siting of anti-game ditches and electric fences guided them past the more vulnerable areas. Buffalo can readily be confined by anti-game ditches. A very successful type of ditch is 6 ft. wide and 2 ft. deep, covered with small brushwood laid over poles. The inner (plantation) side is surmounted by an electric fence. The animals cannot see the bottom of the ditch and think it is a trap. This type of ditch has proved effective against all animals except elephant, which are apt to throw the poles and brushwood aside and walk across. In the coastal Mangrove swamps, some localized damage was done by elephant and hippopotamus, but the most serious depredators are crabs, which do extensive damage to young seedlings. In most respects crab damage is comparable to rat damage in up-country plantations, and is equally severe.

3374. GRISEZ, T. J. **A low-cost deer fence.** *J. For.* 57 (1), 1959 (42–3). 2 refs.

Describes the method followed, which involved stapling the wire to sawmill edgings nailed to standing trees, which were used instead of fence posts.

3375. **Gatelocks.** *For. Equipm. Note, FAO* No. *A.* 14.58, 1958. pp. 1.

Drawings showing (1) a simple lock that works even when a gate sags, and (2) a stop for preventing open gates from being blown to by the wind.

452. Birds

See also No. 3303.

3376. NEF, L. Protection des bourgeons de pins contre les attaques du tétras lyre (*Lyrurus tetrix* L.). **[Protection of Pine shoots against attack by black grouse.]** *Bull. Soc. for. Belg.* 66 (1), 1959 (1–8 + 2 photos). 7 refs. [F.]

Young plantations of *Pinus sylvestris* and *P. nigra* in the Belgian Campine suffer severely from attacks by this bird, which regularly eats the terminal shoots. Treatments with 4 repellents (two with a diphenylguanidine and two with an anthraquinone base) were completely ineffective, all treated shoots being eaten. A moderately thick lime-wash, applied by a long-handled brush of ca. 1·5 cm. diameter, provided almost complete protection (only 2% of trees attacked vs. 83% for controls). Treatment is very cheap and rapid (4000 trees/man-day), and harmless to the trees.

3377. FLETCHER, J. R. **Starling roosts in young plantations.** *Quart. J. For.* 53 (1), 1959 (58–60).

Starlings roosting in Sitka Spruce plantations on a water catchment area caused gross pollution of the water running off from these plantations after medium rainfall. The use of high-frequency sound waves, shooting, and smoke screens proved useless or impracticable, and accordingly the firing of shrapnel rockets into the incoming flocks at dusk was resorted to. Continued firing at dusk for ca. 17 days did disperse the starlings, which have not since attempted to use the plantations as a roost. It appeared that fully stocked plantations in the thicket stage about 20–25 ft. high were most favoured as roosts, and that early brashing is probably desirable in areas where heavy starling concentrations are likely.

3378. KILHAM, L. **Red squirrels feeding at sap-sucker holes.** *J. Mammal.* 39 (4), 1958 (596–7). O.R.S.

Quotes observations on *Tamasciurus hudsonicus* lapping the sap from holes made in *Betula populifolia* and frequently visited by *Sphyrapicus v. varius* for feeding its young.

453. Insects

See also Nos. 2795, 3273, 3856.

3379. STEINHAUS, E. A., and SMITH, R. F. [Editors]. **Annual review of entomology. Vol. 3.** Annual Reviews Inc., Palo Alto, Calif. 1958. pp. 520. Many refs. Price $7.00 (60*s.*).

Includes *inter alia* the following reviews of literature: Chemoreception in arthropods (*E. S. Hodgson*); Internal symbiosis in insects (*A. G. Richards* and *M. A. Brooks*); Nutritional requirements of phytophagous insects (*W. G. Friend*); Uses of sounds by insects (*H. Frings* and *M. Frings*); Dynamics of insect populations (*A. J. Nicholson*); Zoogeography of insects (*J. L. Gressitb*); Resistance of plants to insects (*R. H. Painter*); Biological control of insect pests (*C. P. Clausen*); Biology of Scarabaeidae (*P. O. Ritcher*); Insect eradication programmes (*W. L. Popham* and *D. G. Hall*); The chemistry and action of acaricides (*R. B. March*); Insecticides for control of adult Diptera (*R. W. Fay* and *J. F. Kilpatrick*); Control of forest insects (*R. E. Balch*); and Transmission of plant viruses by arthropods (*K. M. Smith*).

3380. MOTT, D. G. **Cable car for tree sampling.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (6), 1958 (1).

A cable car of the kind used by telephone linesmen was erected in a 70-ft. stand of Balsam Fir to test this method of obtaining branches for Spruce-budworm sampling on permanent sample plots. A large tree was chosen at the centre, and one at a point on the circumference of a circle of 50 ft. radius comprising some 50 co-dominant trees for sampling. A $\frac{5}{8}$-in. flexible steel cable was stretched between these anchor trees (which were guyed to others) through 1-in.-diam. eye-bolts fixed in them 55 ft. above ground. A wooden ladder and small platform were erected in the centre tree to permit easy entry to the car. The operator, tied securely to the car by harness, advances along the cable to a position opposite the crown of a selected tree, where he secures the car with the brake provided on one of the wheels. Pole pruners (up to 15-ft. long) are used to remove the sample branches, which are

dropped to a canvas mat below or lowered in a basket attached to the car by a pulley. Eight trees could be reached along the radius in which this span was erected, and the span could then be moved to obtain fresh trees or additional cables be erected to provide more trees in the same circle. The cable car costs $100 and the cable ca. $20; construction can be carried out by 3 men in 2 days. A skilled operator and 2 men on the ground could probably obtain samples from 40–50 mature trees per day, or ca. twice as many as can be sampled with the extension ladder used at present, which requires 4 men on the ground.

3381. **Forest insect surveys.** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (193–232). 24 refs. [E.] P.R.

Describes the scope, aims, methods, organization etc. of survey work undertaken in the U.S.A. (*J. W. Bongberg*), Netherlands (*J. Luitjes* and *A. D. Voûte*), Bavaria (*W. Zwölfer*) and Canada (*B. M. McGugan*).

3382. McGUGAN, B. M. **The Canadian forest insect survey.** *Repr.* from *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958, (219–32). 20 refs.

Reviews briefly the history of the organization, sets forth its present aims, and in a general way describes the methods employed, with particular emphasis on a punched-card system used for recording and analysis of data.

3383. CROOKE, M. **Some aspects of forest entomology in Britain.** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (233–9). [E.e.] P.R.

A brief discussion of the special problems caused by the preponderance of extensive, largely exotic, conifer stands of the younger age classes, including indigenous and introduced pests, and with particular reference to sawflies and to *Bupalus piniarius* [cf. *F.A.* 19 No. 4571].

3384. KANGAS, E. Über die forstzoologischen Probleme in Finnland. **[Problems of forest zoology in Finland.]** *Anz. Schädlingsk.* 31 (11), 1958 (161–5). 40 refs. [G.]

Reviews briefly, on the basis of literature published since 1919, problems of forest pests (mainly insects) in Finland.

3385. ROMANYK, N. La situación de plagas de insectos forestales en España en 1958. **[The situation with regard to forest insect pests in Spain, 1958.]** *Bol. Serv. Plagas for., Madrid* 1 (2), 1958 (89–93). [Span.]

A short review of the situation, including lists of species attacking Poplar and Pine.

3386. NEVES, C. M. BAETA. La forêt du Portugal et ses problèmes d'entomologie forestière. **[The forests of Portugal and their entomological problems.]** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (251–9). [F.f.] P.R.

A description of the forests, all now largely artificial, their climatic, ecological, and silvicultural conditions, and a brief discussion of the chief pests of the Oak, Chestnut, and Pine forests. Eucalypts have so far remained remarkably free from insect pests. [Cf. *F.A.* 18 No. 4330.]

3387. PARAMONIV, O. Ukrajins'ka lisoentomologična literatura. **[Ukrainian literature on forest entomology.]** In *Ukrajins'kyj lisnyc'kyj al'manah*, New York. 1958. pp. 149–56. 83 refs. [Ukr.e.]

Lists 83 works on forest entomology published in Ukrainian up to 1954.

3388. SINADSKIJ, JU. V. Vrediteli tugajnyh lesov nizovoj Amu-Dar'i. **[Pests of the riparian forests of the lower Amu-Darya.]** *Lesn. Hoz.* 10 (2), 1957 (24–6). [Russ.]

Reviews insect pests (some 20 species) and their host trees: *Salix songarica, S. wilhelmsiana, Elaeagnus angustifolia, Tamarix* sp., and *Halimodendron [argenteum]*.

3389. SZENT-I[ST?]VANY, J. J. H., and WOMERSLEY, J. S. **Some insects of forest trees in New Guinea.** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (331–4). 3 refs. [E.] P.R.

Chief pests mentioned are: the Australian saturniid *Capaxa janetta*, *Megachile lachesis*, a coreid (*Leptoglossus*) and a pentatomid on *Eucalyptus deglupta*, the last two being serious pests of young plantations; *Hyblaea puera* on Teak; and the curculionid *Venapa oberthuri* on Hoop Pine, in plantations and natural stands. *From authors' summary.*

3390. THATCHER, R. C. **References of value in studies of insects affecting the Southern Pines, an annotated list.** *Bull. Dep. For. S.F. Austin St. Coll., Texas* No. 1, 1957. pp. 37.

Annotated references (ca. 150) arranged under the heads: barkbeetles, sawflies, tip moths, weevils, and leaf-cutting ants.

3391. MOSER, J. C. **A study of the interrelationships of the gallmakers of *Celtis occidentalis* L. and their natural enemies.** *Abstr. of thesis*, in *Dissert. Abstr.* 19 (6), 1958 (1484). O.R.S.

Deals with two psyllids and one cecidomyiid and their parasites.

3392. SCHUDER, D. L. **Insect pests of Honey-Locust trees [*Gleditsia triacanthos*].** *Trees Mag., Ohio* 19 (1), 1958 (9).

Notes on *Homadaula albizziae, Agrilus difficilis, Cecidomyia gleditshiae, Eotetranychus multidigituli (Tetranychus ellipticus)*, and *Empoasca pergandei.*

3393. DAVATCHI, G. A. Étude biologique de la faune entomologique des *Pistacia* sauvages et cultivés. **[Biology of the insect fauna of cultivated and wild *Pistacia*.]** *Rev. Path. vég.* 37 (1), 1958 (3–166). 197 refs. [F.] 79 photos. I.M.I.

Treats of the world distribution and systematy of *Pistacia*, its environment and economic importance in Iran and the maltreatment of natural stands from Central Asia to N. Africa. More than 150 species of insect associated with *Pistacia*, belonging to 8 orders and 43 families, are listed with notes and descriptions of new species and one new genus, and an extended account is given of the biology and polymorphism of gall aphids on *Pistacia* in its Old World range. The relative importance of the harmful insects (varying with the district) and modern methods of control for cultivated *Pistacia* are

discussed. The potential production of the 4–5 million trees in Iran is 25,000 tons of nuts, which could probably be doubled by improved cultivation. Actual production is 3000–12,000 tons, insects being considered responsible for destroying > 50 % of the yield.

3394. KURIR, A. Holzinsekten—Holzschutz. **[Wood insects and wood protection.]** *Allgemeine Holzrundschau, Wien* 9 (155/156), 1953; 11 (195/196; 199/200; 201/202; 207/208), 1955; 12 (217/218; 225/226; 237/238), 1956; 13 (239/240; 241/242), 1957. Each pp. 1–4. [G.]

A series of articles on: *Ergates faber*; *Anisandrus dispar*; *Sirex gigas*; *S. augur*; *S. noctilio* and *S. juvencus*; *Xeris spectrum*; *Tremex fuscicornis* and *T. magus*; *Xiphydria longicollis*; *X. camelus* and *X. prolongata*, *Cossus cossus* and *Zeuzera pyrina*, hosts, damage, control etc.

Insects: Natural and Biological Control

See also Nos. 3379, 3413–8, 3421, 3425–6, 3430–2, 3439, 3445–6, 3453–5, 3460–1, 3470–1, 3488, 3494–5, 3510, 3512–3, 3518, 3522.

3395. **Study of population dynamics in forest entomology.** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (109–62). Many refs. [E. or F.] P.R.

This section contains the following papers: On the regulation of insect populations (*A. D. Voûte*; 37 refs.); Is the density of animal populations regulated by mechanisms or by chance? (*F. Schwerdtfeger*; 9 refs.) [describing a model experiment with black and white marbles representing favourable and unfavourable factors acting upon a population, which produced imaginary population fluctuations closely resembling recorded fluctuations of forest pests]; The problem of *Semasia diniana* in Alpine forests (*P. Bovey*; 10 refs.) [summarizing the work of a research team in the Grisons]; Oak defoliators in England (*G. C. Varley* and *G. R. Gradwell*) [see *F.A.* 20 No. 3397]. The population dynamics of the Spruce budworm in Eastern Canada (*R. F. Morris, et al.*) [see *F.A.* 20 No. 3440]; and Life tables for the Lodgepole needle miner *Recurvaria starki* Free. (Lepidoptera : Gelechiidae) (*R. W. Stark*) [cf. *F.A.* 20 No. 3424].

3396. VARLEY, G. C., and GRADWELL, G. R. **Balance in insect populations.** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 2, 1958 (619–24). 20 refs. [E.] P.R.

A theoretical discussion of factors affecting fluctuations and relative size of populations of different pests of the same plant, based on a study of Oak defoliators at Wytham, Berks. During the 8 years of the study, densities of each species varied over a range of 10- to 30-fold, but at very different levels, only *Operophtera brumata* and *Tortrix viridana* ever exceeding 100 larvae per sq. m. ground surface. While density-dependent factors in the strict sense (space and food) are considered insufficient to explain limitations of numbers, it was observed that, after severe defoliation, densities tended to decrease, presumably because of lower productivity caused by food scarcity, even though all larvae of all species reached the pupal stage. The interactions of hosts and parasites are illustrated by census figures for *O. brumata* and its specific tachinid parasite *Cyzenis albicans*, and for the much less abundant *Erannis leucophoearia* and its ichneumonid parasite *Ophion minutus*, including calculations, based on mortality %'s of host and parasite, parasite area of discovery etc., to account for the differences in abundance of the two hosts. [Cf. *F.A.* 15 No. 60.]

3397. VARLEY, G. C., and GRADWELL, G. R. **Oak defoliators in England.** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (133–6). [E.e.] P.R.

A report on a study of Oak defoliators at Wytham, Berks, covering 7 years [cf. preceding abstract], describing methods of sampling of pest and parasite densities etc., and discussing the reasons why parasites are not effective in controlling *Operophtera brumata* and *Tortrix viridana*, whose parasite rates were ca. 30 and 5% respectively. The effect of flushing on survival of *O. brumata* larvae is presented for one year in a table which shows the % of larvae entering buds decreasing from 9·5 (of the egg number) to 1·9 from the earliest- to the latest-flushing trees (*Quercus robur*), with corresponding differences in larval densities. The survival of pupae, however, was greater under the late-flushing trees, and the densities of adults/sq. m. the following year ranged only from 12 to 5.

3398. **Reviews of work in biological control.** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (443–532). [E. or Span.] P.R.

The following regional surveys briefly discuss forest pests: Continental United States (*C. P. Clausen*); Germany (*J. M. Franz*); Poland (*H. Sandner*); Some Commonwealth countries (*W. R. Thompson*) [covering New Zealand, Australia, and S. Africa]; Canada (*A. B. Baird*); Japan (*C. Watanabe*); and also one international: Successful biological control against animals (*H. L. Sweetman*) [an annotated list of pests and controlling organisms].

3399. GÜNTHER, S. Forschungsarbeiten über Infektionskrankheiten bei Forstinsekten als Ergänzung zu gradologischen Untersuchungen. **[Research in diseases of insects as a complement to population-dynamics studies.]** *Forst u. Jagd* 8 (5), 1958 (208). 4 refs. [G.]

A short outline of work and methods at the Institut für Forstwissenschaft, Tharandt, on the biological control of insects by polyhedral viruses, bacteria, fungi, and rickettsia.

3400. DJADEČKO, N. P. Primenenie mjuskardiny v bor'be s listogryzuščimi nasekomymi. **[The use of muscardine to control leaf-eating insects.]** *Lesn. Hoz.* 10 (2), 1957 (27). [Russ.]

Preparations of *Beauveria bassiana* were sprayed to control *Galerucella luteola* on Elm. The addition of DDT or BHC dust to the spray increased its effect, causing severe muscardinosis in the *G. luteola* population.

3401. WEISER, J. **Protozoan diseases in insect control. With discussion.** *Proc. 10th int. Congr.*

Ent., Montreal 1956 Vol. 4, 1958 (681–5). 9 refs. [E.e.] P.R.

Discusses, in particular, microsporidians, mode of infection, transmission of infection, host specificity etc., including experiments on *Hyphantria cunea*, *Euproctis phaeorrhoea* and *Lymantria dispar* [cf. *F.A.* 18 No. 3067].

3402. WELCH, H. E. **A review of recent work on nematodes associated with insects with regard to their utilization as biological control agents.** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (863–8). 62 refs. [E.e.] P.R.

The insect hosts include barkbeetles, melolonthids, and weevils; the literature, English, German, French and Russian sources.

3403. SCHMIDT, H. W. Die Bedeutung der Spinnen für das biologische Gleichgewicht im Wald und Massnahmen für ihre Vermehrung. **[The role of spiders in the biological equilibrium of forests, and measures to promote their increase.]** *Allg. Forstztg.* 70 (1/2), 1959 (8–9). [G.]

Briefly discusses observations made in Bavaria, where large numbers of spiders were found to attack larvae of *Myelophilus piniperda* in outbreak areas, and also those of *Hyloicus pinastri*, *Lymantria monacha* and *Bupalus piniarius*. *Thomisus viaticus* and *Lyniphia montana* are mentioned as the most frequent spiders. The promotion of moist shady habitats for spiders is recommended.

3404. MORETON, B. D. **Beneficial insects.** *Bull. Minist. Agric., Lond.* No. 20, 1958. pp. 49 + 4 plates. Price 5*s.* 6*d.*

Predators and parasites discussed are arranged by orders and families. They are chiefly those attacking pests of fruit trees and field crops, but some species attacking forest and timber pests are included, e.g. *Chrysopa prasina* and *Scymnus* feeding on *Adelges*, *Korynetes caeruleus* preying on the furniture and death-watch beetles.

3405. GEORGE, J. **Bamboo nestboxes.** *Indian For.* 84 (11), 1958 (687–92). 8 refs.

Describes (with diagrams) the construction of nesting boxes from sections of bamboo culms, and gives tabulated data on their use by a number of common species of birds.

Insects: Silvicultural Control

See also Nos. 3419, 3497.

3406. **Forest management in relation to cultural control of insects.** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (163–92). Many refs. [E.] P.R.

This section contains the following papers: Studies on the silvicultural control of conifer aphids in Hokkaido, Japan (*M. Inou(y)e*) [see *F.A.* 20 No. 3419]. Progress in barkbeetle control through silviculture in the United States (*F. P. Keen*; 40 refs.) [a review, with special reference to the control of *Dendroctonus brevicomis*]; Englemann Spruce beetle control in Colorado (*N. D. Wygant* 6 refs.) [cf. *F.A.* 15 No. 3826; 20 No. 2105]; and Trends in forest management in Eastern Canada and the relation of these to control of forest insects (*B. W. Flieger*).

3407. WIĄCKOWSKI, S. Entomofauna pniaków sosnowych w zależności od wieku i rozmiaru pniaka. **[The insect fauna of Pine stumps in relation to the age and size of the stump.]** *Ekologia Polska, Warszawa* 5*A* (3), 1957 (14–140). 63 refs. [Pol.pol. e.*e.*] Price *Zl.* 25. O.R.S.

Presents the results of studies on: durability, and changes with age in chemical constituents and moisture content, of stump sapwood and heartwood; variations in the insect fauna with age and size of stump, and their seasonal variations; and species present and the proportions of beneficial and harmful insects. Clear-felling causes an increase in harmful species and should be avoided. Stumps, especially on poor sites, should be barked. *From author's summary.*

Insects: Chemical Control (General)

See also Nos. 3274–5, 3379, 3400, 3414, 3425, 3435–8, 3446–7, 3449–52, 3455, 3458, 3463–4, 3469, 3472–4, 3476, 3481–3, 3486–8, 3494, 3501, 3523.

3408. FETTES, J. J. **Problems of forest aerial spray dispersal and assessment.** *Repr.* from *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (281–9). 20 refs.

Deals with problems peculiar to forest spraying on an experimental scale, and indicates desirable lines for future research.

3409. ROGOVA, T. I. Vlijanie insekticidov na razvitie sejancev i saženčev. **[The influence of insecticides on the growth of seedlings and transplants.]** *Lesn. Hoz.* 11 (4), 1958 (32–6). [Russ.]

Trials with BHC to protect seedlings and transplants of Scots Pine, Spruce, Larch and *Tilia* sp. showed that the effect of the insecticide on growth depended largely on the method of application. Working 12% BHC dust into the soil at rates of 60, 120, or 180 kg./ha. did not impair growth, whereas dusting the roots (0·25 and 0·5 g./plant) did so markedly. Younger plants were more susceptible to damage than older ones.

3410. WACHTENDORF, W. Über die Gefahren des Einsatzes von Dieselöl als Trägermittel für Insektizide. **[Dangers of diesel oil as a solvent for insecticides.]** *Allg. Forst- u. Jagdztg.* 129 (11/12), 1958 (260–3). 13 refs. [G.g.e.]

Following experiences in the control of *Laspeyresia pactolana* on young Spruce, *Evetria buoliana* on Pine, and *Cryptorrhynchus lapathi* on Alder, where the use of diesel oil alone or as a solvent for BHC (crude or γ isomer) or systemic poisons had led to high insect mortality but also frequently to severe, even lethal, injuries to the Spruce, tests were made with coating or spraying various parts of 16 coniferous or broadleaved species, mostly during the dormant period, with diesel oil and diesel oil + BHC. Generally, no injury was done to stems and branches $\leq$ 10 cm. thick, but smaller branches, buds, foliage etc. suffered, damage being greatest with crude BHC. Dormant Oak, Hornbeam, and Willow appeared to be wholly resistant. It is concluded that diesel oil

as a solvent is promising only against bark-inhabiting insects.

Insects: Other Means of Control

3411. BACCETTI, B. L'energia nucleare contro gli insetti nocivi. **[The use of nuclear energy to control harmful insects.]** *Ital. agric.* 95 (11), 1958 (713–7). 15 refs. [It.] E.M.B.

A review of literature on the use of e.g. γ-rays to sterilize harmful insects [cf. *F.A.* 19 No. 721].

Orthoptera

See No. 3009.

Isoptera

See Nos. 2728, 3866–7.

Hemiptera

See also Nos. 2729, 3389, 3391–2, 3403, 3406.

3412. MALHOTRA, C. P. **Bionomics of *Serinetha augur* Fabr. and its association with *Dysdercus cingulatus* Fabr., the red cotton bug.** *Indian For.* 84 (11), 1958 (669–71 + 1 photo, 1 set of drawings). 10 refs.

Describes experiments in laboratory rearing of *S. augur*, which was found to bore into the seed of Kusum (*Schleichera oleosa*), reducing % germination to 2 compared with 50 for controls. *D. cingulatus* was found along with *S. augur* on Kusum fruits, and in laboratory tests was reared on them.

3413. EWAN, H. G. **Population measurements and host damage potential of the Saratoga spittlebug.** *Abstr. of thesis*, in *Dissert. Abstr.* 19 (4), 1958 (913). O.R.S.

Summarizes studies on the distribution of the beetle in N. America, its feeding habits and life cycle, and natural control by frosts and drought, parasites, predators, a fungus disease, and dying out of the alternate hosts (sweetfern and *Rubus* spp.) as a result of crown closure. Describes the symptoms of damage to Red Pine, and a method of identifying potentially damaging infestations by measuring the insect population (from the average number of nymphs per $\frac{1}{10}$ milliacre) in relation to tree size and density, expressed as a 'tree unit', viz. the product of the mean tree height in feet, the mean number of living branch whorls per tree and the mean number of trees per acre.

3414. MIKLOŠ, I. Pojava cvrčka *Ceresa bubalus* Fabr. na topolama u NR Hrvatskoj. **[*C. bubalus* on Poplar in Croatia.]** *Topola, Beograd* No. 6, 1958 (455–61). 6 refs. [Croat.g.]

Describes damage by the membracid tree-hopper *C. bubalus*, which lays its eggs in the cambium of young Poplars, and leaves scars of 2–3 cm. which are then vulnerable to fungal attack. Serious infestations, as noted in the garden of the Entomological Institute, Zagreb, are only considered likely in the immediate neighbourhood of lucerne or other leguminous plants on which the insects develop. If location of Poplar nurseries or plantations near legumes cannot be avoided, control may be obtained by winter spraying with DNC.

3415. PSCHORN-WALCHER, H., and ZWÖLFER, H. **Preliminary investigations on the *Dreyfusia* (*Adelges*) populations, living on the trunk of the Silver Fir.** *Z. angew. Ent.* 42 (3), 1958 (240–77). 47 refs. [E.g.] O.H.

Reports on studies of endemic populations of *D. piceae*, f. *typica* and *D. nüsslini* f. *schneideri* on the stems of Silver Fir in 27 pure and mixed stands in Switzerland, France (Vosges) and Germany (Black Forest). Light, open, dry stands had generally smaller populations per tree and fewer infested trees than dense, moist stands. Infestation trials in cages generally led to increased populations except where a tree had had a mass infestation. Protection against the weather and prevention of dispersal appeared to favour increases in cages. Egg clusters of endemic populations tended to be smaller than those of mass populations. Observations on population fluctuations on mass-infested trees (interrupted, after ca. a year, by the virtual destruction of the aphids by the 1956 frost) are described. Factors causing decline of mass infestations, including the weather, overcrowding, bark exhaustion, and physiological regression are discussed. The validity of the methods and some of the findings of Karafiat and Franz [cf. *F.A.* 19 Nos. 2025–7], particularly regarding the role of predators, is questioned. Mass infestations appeared to be less frequent in mixed stands than in pure coniferous stands. *From authors' summary.*

3416. **[Biological control of the Balsam woolly aphid.]** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (777–825). [E.e.] P.R.

Includes papers on the following aspects: the Balsam woolly aphid in Europe (*L. P. Mesnil*); the effectiveness of predators and food in limiting gradations [population build-ups] of *Adelges piceae* in Europe (*J. M. Franz*); *A. nüsslini* and its predators in Eastern France (*H. G. Wylie*); the predators of *A. piceae* and *A. nüsslini* in Sweden (*H. Pschorn-Walcher* and *M. Kraus*); Climatic and biocoenotic aspects for the collection of predators of *A. piceae* in Europe (*H. Pschorn-Walcher*); *A. piceae* in Canada with reference to biological control (*R. E. Balch, R. C. Clark*, and *N. R. Brown*); Predators of *A. piceae* recently introduced in Canada (*B. C. Smith*); and *A. piceae* in the United States (*P. B. Dowden* and *D. Crosby*).

3417. BALCH, R. E., CLARK, R. C., and BROWN, N. R. ***Adelges piceae* (Ratz.) in Canada with reference to biological control.** *Repr.* from *Proc. 10th int. Congr. Ent., Montreal* Vol. 4, 1956 (1958), (807–17). 29 refs.

Reviews briefly what is known about *A. piceae* in Canada, discusses some questions that have arisen in the course of the introduction of natural enemies from Europe, and summarizes progress to date.

3418. DELUCCHI, V. Note generali sui predatori di *Dreyfusia piceae* Ratz. e sui loro parassiti. **[General notes on the predators of *Dreyfusia* [*Adelges*] *piceae* and their parasites.]** *Bollettino del Laboratorio di Zoologia Generale e Agraria, Portici* 33, 1956 (283–302). 17 refs. [It.it.] I.I.E.

Notes on the European predators, and their parasites, and the introduction into Canada of the most effective (*Pullus impexus*, *Aphidecta obliterata*, *Laricobius erichsoni* and *Cremifania nigrocellulata*).

3419. INOU(Y)E, M. **Studies on the silvicultural control of conifer aphids in Hokkaido, Japan.** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (163–70). [E.e.] P.R.

A study of *Cinara todocola* recorded from Todomatsu (*Abies sachalinensis*) and *A. firma*, its life cycle [cf. *F.A.* 18 No. 632], growth injuries caused to young plantations [cf. *F.A.* 16 No. 4301] and ecology. In experiments with artificially infested 4-year-old Todo Fir [*A. sachalinensis* var. *mayriana*?] planted out under 20-m.-high Todomatsu stands, a correlation was found between evaporation in the stand and increase of aphid populations. On two uncut plots, both evaporation and aphid populations declined from June to October; on partly cut plots where evaporation was higher, aphid populations were also higher, and on a clear-cut plot, where evaporation was highest, they were greatest. Populations on 4-year-old potted seedlings that had become heavily infested, naturally, on a clear-cut site, declined rapidly when the pots were transferred to the shade of a dense canopy. Silvicultural conclusions are drawn.

3420. EDMUNDS, G. F., and ALLEN, R. K. **Comparison of Black Pine leaf scale population-density on normal Ponderosa Pine and those weakened by other agents.** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (391–2). [E.e.] P.R.

A study in Spokane county, Washington, indicated that: (1) there was little difference in conditions between uninfested trees and trees with $\geqslant 1$ scale per inch of needle; (2) greater densities of infestation were directly correlated with injuries, manifested by shorter needles and poor needle retention; and (3) there was no greater degree of infestation in trees weakened by various other agents, such as dwarf mistletoe (*Arceuthobium* sp.), poisoning through weedkillers, and atmospheric fluorides.

3421. MÜLLER, H. Zur Kenntnis der Schäden, die Lachniden an ihren Wirtsbäumen hervorrufen können. **[Potential injuries to host trees by lachnids.]** *Z. angew. Ent.* 42 (3), 1958 (284–91). 13 refs. [G.g.e.] O.H.

Reviews literature, and reports and describes the author's own observations, particularly the increase of injuries to Beech by *Lachnus exsiccator* near even quite small ant nests, which makes it necessary to weigh carefully possible advantages of the ants against such danger to Beech, when introducing ant colonies into mixed Pine/Beech stands. [Cf. *F.A.* 18 No. 4304.]

Lepidoptera

See also Nos. 2730–1, 2814, 3168, 3383, 3389–90, 3394–7, 3401, 3403, 3410.

3422. HENSON, W. R. **Some ecological implications of the leaf-rolling habit in *Compsolechia niveopulvella* Chamb.** *Repr.* from *Canad. J. Zool.* 36, 1958 (809–18). 4 refs.

The provision of shelter within tied leaves is shown to increase and modify feeding of *C. niveopulvella* in the same way as raising ambient humidity. On this basis the leaf-rolling habit of the larvae is concluded to be of direct selective advantage from the viewpoint of water economy as well as habitat temperature. *From author's summary.*

3423. STRUBLE, G. R. **Lodgepole needle miner [*Recurvaria milleri*].** *For. Pest Leafl. U.S. For. Serv.* No. 22, 1958. pp. 7. 3 refs.

3424. STARK, R. W. **Life tables for the Lodgepole needle miner *Recurvaria starki* Free. (Lepidoptera: Gelechiidae).** *Repr.* from *Proc. 10th int. Congr. Ent., Montreal 1956*, Vol. 4, 1958, (151–62). 20 refs.

A method for preparing life tables for *R. starki* is described and samples from two locations are presented. Conventional column headings are used, with the omission of the life-expectation columns (e_x) and the addition of the mortality-factor column (d_xF), suggested for Spruce-budworm life tables [cf. *F.A.* 16 No. 1977]. The latter permits tabulation of the different mortality factors. The major mortality factor, winter climate, is discussed briefly in its role of reducing the outbreak populations. The two examples present different population histories, believed to be related to local climatic differences. Incomplete life tables are presented for 1948–54 and complete ones for 1954–56, and are compared with those of Spruce budworm on an equivalent scale. *From author's abstract.*

3425. EIDMANN, H. Lärkträdsmalen (*Coleophora laricella* Hbn.). [*C. laricella.*] *Svenska SkogsvFören. Tidskr.* 56 (4), 1958 (399–418). 23 refs. [Sw.g.g.]

Discusses distribution, biology and ecology, mortality factors, economic importance and control in Sweden (chiefly central Sweden) on the basis of investigations soon to be published in full elsewhere. All species of Larch and (rarely) Douglas Fir were attacked, particularly younger trees. Birds were the most important natural enemies. Xylamon G.I. in oil sprayed before, and Thiodan (water emulsion) sprayed after, flushing gave good control.

3426. GRAHAM, A. R. **Effectiveness of two introduced parasites of the Larch casebearer, *Coleophora laricella* (Hbn.) (Lepidoptera: Coleophoridae), in Ontario.** *Report of the Entomological Society of Ontario, Toronto* No. 88, 1957 (1958), (37–41). 2 refs. I.I.E.

The importation and release of 5 species of parasites were described earlier [see *F.A.* 7 No. 2064]. *Agathis pumila* is the most effective biological control agent in Ontario, as it has spread over a large area with light infestations of *C. laricella* in discontinuous Larch stands and has parasitized large %s of the population. *Chrysocharis laricinellae* is not an effective biological control agent as its ability to spread depends on high host populations.

3427. SUNDBY, R. **The marking of the moth *Phyllocnistis labyrinthella* Bjerk. with radioactive phosphorus.** *Oikos* 9 (2), 1958 (253–9). 9 refs.

Laboratory experiments showed that a high

radioactivity without signs of injurious effect was obtained by feeding the imago with a P^{32} solution containing 100 μ curies/ml. This gave an activity of 100,000 counts/min., and the moth can be registered at a distance of $\frac{1}{2}$ m. The presence of tagged moths released on Aug. 5th could be detected in the field with a Geiger counter until the end of September. [Cf. *F.A.* 19 No. 3204.]

3428. CONDRASHOFF, S. F. **Differences in Aspen phenology and survival of immature stages of *Phyllocnistis populiella* Chamb.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (6), 1958 (3–4).

Two adjacent groves of Aspen (*Populus tremuloides*) were studied for possible effects of host phenology on populations of this leaf-miner. Trees in both groves were ♂s of about the same age, differing by ca. 2 weeks in date of flushing. Adults of *Phyllocnistis populiella* began to oviposit on early-flushing trees (*a*) when the buds opened, and continued for a week until the leaves attained ca. $\frac{2}{3}$ their final size on 4 May. Oviposition began on 7 May on late-flushing trees (*b*) and again ceased when the leaves attained $\frac{2}{3}$ their final size on 13 May. This indicates that rate of leaf development may be a limiting factor for oviposition. More eggs were laid on (*a*), but total larval mortality was also higher, resulting in a mean of 0·74 cocoons per leaf on (*a*) compared with 1·29 in (*b*). Total cocoon mortality, however, tended to be higher on (*b*), so that, in absolute figures, slightly more adults (0·23 per leaf) were produced on (*a*) than on (*b*) (0·17 per leaf), though the % survival from egg to adult stage was about the same. The results indicate that differences in tree phenology might be an important consideration when sampling for Aspen leaf-miner populations.

3429. OSSOWSKI, L. L. J. **Notes on Wattle insects observed during the period 1957–1958.** *Rep. Wattle Res. Inst. S. Afr. 1957/58*, 1958 (34–6).

An account is given of Wattle insects observed during 1957–58 and of the damage done. Two insects, the thorn bagworm (*Melasina halicutis*) and wireworms (*Agriotes* spp.), not previously recorded as potential Wattle pests, are mentioned.

3430. SCHÖNHERR, J. Rindenminen an Buche und Eiche mit besonderer Berücksichtigung ihrer forstlichen Bedeutung. **[Forest importance of bark miners in Beech and Oak.]** *Forst u. Jagd* 8 (6), 1958 (252–3). 2 refs. [G.]

Biological notes on the Nepticulidae, *Ectoedemia liebwerdella* on Beech, parasitized by the braconid *Adelius erythronotus*, and *E. atrifontella* on Oak. Both are primary phellogen miners, the latter not yet known to start secondary invasions. Some 20,000 of the former may infest a single healthy Beech and, though not causing material loss of increment, could open the way to secondary invasion complexes.

3431. ZWÖLFER, H., and KRAUS, M. **Biocoenotic studies on the parasites of two Fir and two Oak tortricids.** *Entomophaga, Paris* 2 (3), 1957 (173–95). 17 refs. [E.g.] I.I.E.

A quantitative and qualitative study of the complex host/parasite and hyperparasite relationships of the tortricids *Cacoecia murinana* [cf. *F.A.* 18 No. 3097], *Semasia rufimitrana*, *C. xylosteana* and *Tortrix viridana* in a mixed stand in the Vosges, covering one season. Though many parasites were reared from more than one host, many polyphagous species showed marked preferences for certain hosts. Experiments with pupae of *C. murinana* which were attacked by the ichneumonid *Apechthis rufata* when transferred to artificial leaf rolls on Oak, but not attacked on their native Silver Fir, suggest that food plants may determine choice of hosts. In other regions *A. rufata* is known as a parasite of *C. murinana*, and these and other observations on host preferences point to the great complexity of the problem.

3432. GIBB, J. A. **Predation by tits and squirrels on the eucosmid *Ernarmonia* [*Laspeyresia*] *conicolana* Heyl.)** *J. Anim. Ecol.* 27 (2), 1958 (375–96 + 1 plate). 13 refs.

From a study in Pine plantations in Thetford Chase (1952–57) it is concluded that tits may normally be density-dependent predators and red squirrels density-independent predators on *E. conicolana* larvae. The number of cones eaten by squirrels was 16–65% of Scots Pine and 80–93% of Corsican Pine. Cones are, however, normally collected for seed before the squirrels have taken their toll, and the destruction of Pine seed by *E. conicolana* and squirrels is economically unimportant.

3433. MILLER, W. E., and ALTMANN, S. A. **Ecological observations on the Virginia pitch-nodule moth, *Petrova wenzeli* (Kearfott), including a note on its nomenclature (Lepidoptera, Olethreutidae).** *Ohio J. Sci.* 58 (5), 1958 (273–81). 20 refs. C.G.B.

Notes, based on a study in Ohio, on the biology and life history of a pest of *Pinus virginiana*, *Petrova virginiana*, here renamed *P. wenzeli*.

3434. GREEN, G. W. **Low winter temperatures and the European Pine shoot moth [*Rhyacionia buoliana*].** *Abstr.* in *Proc. 10th int. Congr. Ent. Montreal 1956* Vol. 4, 1958 (373). [E.] P.R.

Overwintering larvae from 4 different temperature zones in Ontario, and 2 in Michigan, showed no significant differences in their ability to undercool. However, these insects exhibited active cold-hardening when held at temperatures between + 7 and − 7° F. for one week before the undercooling tests. [Cf. *F.A.* 16 No. 1974.]

3435. MILLER, W. E., and HAYNES, D. L. **Control of the European shoot moth with concentrated DDT sprays.** *Tech. Note Lake St. For. Exp. Sta.* No. 543, 1958. pp. 2.

On the basis of experiments in spraying young Red Pine plantations in Lower Michigan by mist-blower, suggests applications for 4- to 6-ft. trees of 1 gal. 25% DDT/9 gal. water at a dosage of 50 gal./acre, and for trees > 4 ft. high, 35 gal./acre. Spraying should not be attempted at wind velocities of > 7 m.p.h.

3436. MILLER, W. E., and HAYNES, D. L. **Timing DDT sprays in the spring for European shoot moth control.** *Tech. Note Lake St. For. Exp. Sta.* No. 542, 1958. pp. 1.

A 90% control of *Rhyacionia buoliana* in infested young Red Pines in Lower Michigan was obtained by spraying with 2 lb. DDT/100 gal. water in April, i.e. for 2 weeks before and 2 weeks after the beginning of larval activity. When the concentration was doubled, the effectiveness of the spray was extended for a week.

3437. BUTCHER, J. W., and HAYNES, D. **Fall control of European Pine shoot moth on Pine seedlings.** *Quart. Bull. Mich. agric. Exp. Sta.* 41 (2), 1958 (264–8).

In September spraying of 3-year Pine at the Michigan State University nursery to control *Rhyacionia buoliana* before autumn shipment, Phosdrin applied to run-off at 1 lb./100 gal. water gave the best control (92–97%), much better than Guthion, BHC or DDT applied in 1, 3 and 6 lb./100 gal. concentrations respectively. Dipping with Phosdrin at the above concentration showed promising results, but the 10-sec. treatment used with Red Pine was not long enough; 3-min. immersions of Scots Pine gave complete control after 10 days when the insecticide was not washed off immediately after application. [Cf. *F.A.* 16 No. 4309; 18 No. 4308.]

3438. HAYNES, D. L., GUYER, G., and BUTCHER, J. W. **Use of systemic insecticides for the control of the European Pine shoot moth infesting Red Pine.** *Quart. Bull. Mich. agric. Exp. Sta.* 41 (2), 1958 (269–78).

Treatment of *Rhyacionia buoliana* on 7-year-old Red Pine plantations in Michigan with systemic insecticides containing phosphate compounds, showed that foliar sprays at 2 lb./100 gal. water, applied in April or August, gave better control after 30 days than soil treatments or applying saturated gauze bands 4 in. wide to the rough bark; sprays of Phosdrin, American cyanamid 12008 and Thimet all gave a similar degree of control. On one plantation soil treatment in Aug. 1956 with Thimet at 10 lb./acre gave 78–81% control of the succeeding generation by June 1957, the best results being from the soil drench. Banding also gave reasonable control by the following June, but soil and banding treatments gave poor results in the other plantation, where tree growth was poor and translocation less efficient.

3439. JAHN, E. Zusammenfassender Bericht über das Massenauftreten des grauen Lärchenwicklers in den Jahren 1954–1957. **[The *Semasia diniana* epidemic [in Austria] 1954–57.]** *Cbl. ges. Forstw.* 75 (2), 1958 (77–105). 13 refs. [G.g.]

Presents detailed observations on development and spread, population counts, mortality factors etc., including a table of parasites bred from *S. diniana* and other Larch feeders. The chief factor causing collapse was, as in the 1946–47 epidemic, a virus disease.

3440. MORRIS, R. F., *et al.* **The population dynamics of the Spruce budworm in Eastern Canada.** *Repr.* from *Proc. 10th int. Congr. Ent., Montreal 1956*, Vol. 4, 1958, (137–49). 22 refs.

Based largely on published reports of the Green River studies.

3441. BLAIS, J. R. **Effects of 1956 spring and summer temperatures on Spruce budworm populations (*Choristoneura fumiferana Clem.*) in the Gaspé Peninsula.** *Repr.* from *Canad. Ent.* 90 (6), 1958 (354–61). 8 refs.

Insect development was greatly retarded by subnormal temperatures in May, June, July and August. In some regions, development of the larvae was further retarded by a shortage of current year's foliage on Balsam Fir and Spruces. At higher altitudes, in the Shickshock Mountains, development was retarded to the point where some pupae and a considerable number of eggs failed to emerge before the onset of the cold autumn weather. For the same reason also, many first-instar larvae seem to have been killed. As a consequence, populations were very low in the Shickshock Mountains in 1957. Elsewhere in the Gaspé Peninsula, however, populations were high, and there is no reason to believe that the infestation is coming to an end. *From author's summary.*

3442. WAGG, J. W. B. **Environmental factors affecting Spruce budworm growth.** *Res. Bull. Ore. For. Lds. Res. Cent.* No. 11, 1958. pp. 27. 12 refs.

The influence of air temperature on Spruce budworm (*Choristoneura fumiferana*) growth, the growth of the host, and interrelationships between insect and host were studied on 15 areas in Oregon from 1951 to 1954. Growth of the budworm was found to depend upon the growth of the host (*Abies grandis*), but varied with stand density. On plots with an average instar value of 5, average lateral growth of *A. grandis* was 1·47 in. in dense stands compared with 2·28 in. in open areas. The growth of *A. grandis* is related to accumulated degree days as well as to stand density. Growth of the insect, in instars, is related to accumulated degree days. At an average accumulation for all areas, of 300, 400 and 500 degree days, the Spruce budworm developed to 2·9, 3·8, and 4·5 instars respectively. Soil temperature was poorly correlated with insect development and accumulated temperature. Insect development was found to be retarded by 0·81 days for each increase of 100 ft. in altitude. It is concluded that temperature data can be used for the prediction of budworm development, taking into account the average altitude of the forest.

3443. HARVEY, G. T. **A relationship between photoperiod and cold-storage treatment in the Spruce budworm.** *Science* 128 (3333), 1958 (1205–6). 3 refs. O.R.S.

Exposure of diapausing second-instar larvae of *Choristoneura fumiferana* to continuous light at 21°C. after 6 weeks' storage at 0° induced the emergence of considerably more larvae than exposure to photoperiods of 15 or 18 hr. After 20 weeks' storage there were only negligible differences between

emergence after exposure to the longer photoperiods, but emergence for 0- and 12-hr. photoperiods was considerably lower after storage periods of all lengths.

3444. STEHR, G. **On problems and methods in the study of a sex-limited dimorphism.** *Repr.* from *Proc. 10th int. Congr. Ent., Montreal 1956*, Vol. 2, 1958, (807–9). 6 refs.

Includes discussion of a case of polymorphism in *Choristoneura fumiferana.*

3445. ZWÖLFER, H. **Observations on the parasite complex of *Choristoneura* (*Cacoecia*) *murinana* Hb. (*Lepidoptera* : *Tortricidae*).** *Proc. 10th Congr. Ent., Montreal 1956*, Vol. 4, 1958 (869–72). 6 refs. [E.e.] P.R.

Of 24 parasite species reared from *C. murinana* in the Vosges, 9 were first records from this host. Results are compared with those obtained in other regions. [Cf. *F.A.* 18 No. 3097.]

3446. BLAIS, J. R., and MARTINEAU, R. **Status of the Spruce budworm in the Lower St. Lawrence and Gaspé Peninsula at the end of 1958 with special reference to spraying operations.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (6), 1958 (1–2).

Studies throughout the area showed that parasites destroyed ca. 30% of the budworm population annually from 1954 to 1957. In 1958, parasitization was double that of past years, and in 1959 budworm populations are expected to reach the endemic level. The part played by spraying with DDT in bringing about this state of things, is discussed.

3447. WEBB, F. E. **Biological assessment of aerial forest spraying against Spruce budworm in New Brunswick. II. A review for the period 1952–1956.** *Repr.* from *Proc. 10th int. Congr. Ent., Montreal 1956*, Vol. 4, 1958, 303–16). 17 refs. [Cf. *F.A.* 17 Nos. 3035, 4167.]

3448. JAQUITH, P. H., *et al.* **Preliminary study of growth losses in Minnesota Jack Pine following defoliation by the budworm [*Choristoneura pinus*].** *Minn. For. Note* No. 74, 1958. pp. 2.

A study was made of 6 matched pairs of trees, one of each pair lightly (20–50% new growth) and the other moderately (100% new growth and 26–75% old growth) damaged. Both degrees of defoliation resulted in substantial reduction of increment, but moderate defoliation had much the more serious effects, which persisted into the second year after defoliation.

3449. SCHÜTTE, F., and JÄGER, A. Versuche zum Flugzeugeinsatz im Forstschutz. II. Bekämpfung des Eichenwicklers, *Tortrix viridana* L. **[Trials on the use of aircraft in forest protection. II. Control of *T. viridana*.]** *Forst- u. Holzw.* 13 (23), 1958 (464–5). 2 refs. [G.]

[Cf. *F.A.* 20 No. 2074.] The trials were made on a 75-year Oak stand before flushing, and involved spraying with 2 kg. DDT/ha., (*a*) in 40 litres water/ha. as emulsion; (*b*) ditto as suspension; (*c*) in 20 litres diesel oil/ha.; and 1·5 kg. DDT/ha., (*d*) in 20 litres diesel oil/ha. The effects of (*a*) and (*b*) were similar, but oil-based sprays seemed rather better than water-based ones. None of the treatments was completely satisfactory, the numbers of surviving larvae as %s of egg numbers being (*a*) 42, (*b*) 37, (*c*) 27, (*d*) 36.

3450. OSSOWSKI, L. L. J. **Spraying experiments with insecticides against Wattle bagworm, *Kotochalia junodi* (Heyl.). II.** *Rep. Wattle Res. Inst. S. Afr. 1957/58*, 1958 (37–9). 2 refs.

[Cf. *F.A.* 18 No. 1876.] Single-tree plots were treated from the ground with 3 different insecticides—toxaphene, endrin, and a similar chlorinated hydrocarbon, WL 1650. These were dissolved in light diesel oil, toxaphene at the rate of 0·75 lb./gal. of solution, and the two others at 0·67 oz./gal. The rate of application was 2 gal./acre. One trial was carried out when the bagworm larvae were in their early instars, and another when they were older. Mortality was assessed 11 days after spraying in the first, and 14 days after in the second trial. The rate of 'fall off' of dead and moribund larvae was also determined. No difference in the final % 'fall off' between treated plots was found, though the initial rate in the first experiment was highest in those treated with endrin. There was no significant difference in over-all toxicity between the insecticides applied against larvae in their earlier instars, but endrin was significantly superior to the others when used against older larvae. *From author's summary.*

3451. WEBB, D. v. V. **Preliminary field experiments with aerial sprays against larvae of the Pine tree emperor moth, *Nudaurelia cytherea capensis*, Stoll.** *J. S. Afr. For. Ass.* No. 31, 1958 (6–20 + 1 tbl.). 15 refs. [E.e.afrik.]

Describes experiments with low-volume spraying (3 gal./acre) as an alternative to the use of pigs in *Pinus radiata* stands in various parts of S. Africa. Endrin at 2 oz. actual endrin/acre, toxaphene at 2·5 lb./acre and Compound WL 1650 (a chlorinated hydrocarbon under preliminary test) at 2 oz./acre gave > 90% mean kills. Emulsions were cheaper than diesel-oil solutions, and WL 1650 cheaper than endrin. DDT was not successful.

3452. **[Experimental use of [γ-BHC] smokes to control *Dendrolimus punctatus*.]** *For. Sci., Peking* 1958 (3), (319–30). [Chin.chin.russ.]

The toxicity of smokes was tested in May–June 1957 in Chekiang Province. Selected sites, of 114–250 m. alt. and 5–20° slope, carried stands of pure 20- to 35-year *Pinus massoniana*, average height 10 m., density 0·4–0·6. The proven Chinese preparation (6)III-A containing 60% BHC and 7·8% γ-BHC powder was used, being ignited in a hollow bamboo. The object was to control the first larval brood of the year at all stages. Experiments were first made in sealed rooms and then in the forest, with different amounts of the preparation, at different hours of the day and night, and with the smoke disseminator fixed and mobile. In field conditions, wind velocity was ⩾ 1 m./sec. The smokes proved very effective, the dosage being varied according to the larval stage. In a closed room for 15 min. results were: 12 mg. γ-BHC/cu.m. on 2nd-instar larvae caused complete mortality, 15

mg. on 3rd and 4th instars 96 and 93% mortality respectively, 18 mg. on 5th and 6th instars, 75%. Of the survivors, 75·5% made cocoons, of which 22% produced adults. The smoke caused older larvae to form cocoons prematurely. In field conditions different dosages were used depending on the age of the insects, as follows: for 2nd and 3rd instars, 7·5 kg. insecticide, including 585 g. BHC/ha., gave 96% control after 2 days, and within the stand only ca. 1% survived; for the 4th and some 5th instars 15 kg. insecticide containing 1170 g. γ-BHC gave > 90% control, ⊁ 7% surviving in the stand. After the 5th and 6th instars the applications became less effective but caused the larvae to form cocoons prematurely. The amount of insecticide per ha. needed to control the later instars was 4 times that needed for the 2nd and 3rd.; 24% formed cocoons prematurely and in the stand only 6·3% of those pupating survived. This smoke proved most effective against the 2nd and 3rd instars. A favourable time for liberating it is from 9 p.m. to daybreak. Broad daylight is not suitable because of ascending air-currents.

3453. **[Preliminary observations on the habits and life history of *Telenomus dendrolimusi* in Tungan, Hunan Province.]** *For. Sci., Peking* 1956 (1), (33–40). [Chin.]

This insect, which lays its eggs in the eggs of *Dendrolimus pini* was earlier recorded by Professor Chu in Chekiang and Kiangsu provinces (1935 and 1936) and reported again in various provinces in 1954. Its life history is given in detail with numerous tables. There may be 11 generations per annum, lasting 11–34 days each, according to the weather, the 7th generation laying the most eggs. An average of 4 larvae (maximum 9) hatch from each parasitized egg. In 1954, after trying > 30 substitute host eggs unsuccessfully, a second (laboratory) host was discovered in *Ocneria mathura*, which is found in *Pinus massoniana* forests.

3454. GÜNTHER, S. Eine bisher unbekannte Mikrosporidie aus dem Ringelspinner (*Malacosoma neustria* L.; Lasiocampidae). **[A new microsporidian from *M. neustria*.]** *Z. PflKrankh.* 65 (9), 1958 (534–5). 7 refs. [G.e.] E.M.B.

In 1955–56, in mass outbreaks of *M. neustria*, 21% of diseased larvae (95% of all larvae collected died within 2 weeks, mainly from polyhedra and bacteria) were found to be infested by a microsporidian for which the name *Plistophora neustriae* sp. nov. is proposed.

3455. LOZINSKIJ, V. A., and ROMANOVA, JU. S. Sočetanie biologičeskogo i aviahimičeskogo metodov bor'by s kol'čatym šelkoprjadom. **[Combined biological and aerial chemical control of *Malacosoma neustria*.]** *Lesn. Hoz.* 11 (6), 1958 (38–40). [Russ.]

Gives brief account of the effect of putting out parasitized egg clusters of *M. neustria* (the chief egg parasite being *Telenomus laeviusculus*) in infested Oak stands in the Ukraine. This is said to have resulted in a 2- to 3-fold increase in the degree of egg parasitization in the treated stands. Notes are also included on the effects of spraying with DDT in diesel oil at various dosages. If the two methods are combined, spraying must be done very early, against the 1st- and 2nd-instar larvae, in order to avoid destroying the parasites.

3456. ROSE, A. H. **The effect of defoliation on foliage production and radial growth of Quaking Aspen.** *For. Sci.* 4 (4), 1958 (335–42). 10 refs.

Shows the phenology of *Populus tremuloides* and the chronology of *Malacosoma disstria* development during an infestation in Ontario in 1950–53, and discusses the degree of defoliation and refoliation in 3 Aspen stands during this period. True refoliation occurred only after complete destruction of the leaves and shoot tips, the new leaves being produced from buds that would otherwise not have developed until the next year. Partial defoliation by *M. disstria*, occurring when ca. ¼ of the diam. growth had been made, slowed down diam. growth throughout the remainder of the growing period, but growth stopped completely only on totally defoliated trees, on which it was not resumed for the rest of the season even after refoliation. Defoliation from frost, sleet and hail occurred in 1953 before diam. growth had begun, and growth started after refoliation. Neither type of defoliation caused either the formation of a double growth-ring or the absence of a growth ring in the lower part of the stem.

3457. REDDY, D. B. ***Eupterote mollifera* and host specificity.** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (349). [E.] P.R.

A brief description of the caterpillar and its habits. It is chiefly a pest of *Moringa pterygosperma*, which is sometimes completely defoliated, but it could also feed on other species, all ornamentals.

3458. MENON, K. D. **Defoliation of an experimental pulpwood plantation.** *Malay. Forester* 21 (4), 1958 (230–5).

Forty acres of *Albizzia falcata* were completely defoliated by larvae of the moth *Semiothisa emersaria* early in 1958. The same plantation was defoliated at the same period in 1957 by larvae of the butterfly *Eurema hecabe contubernalis*. In both cases attack started after a spell of comparatively dry weather. Complete control was achieved by DDT applied with a 'Swingfog' apparatus. Details and costs of the operation and of the life histories of the two insects are given.

3459. SCHEFER-IMMEL, V. Einige Bemerkungen zur Biologie und zum Einfluss von Temperatur und rel. Luftfeuchtigkeit auf die Entwicklung von Ei, Raupe und Puppe von *Boarmia bistortata* Goeze (Lepidoptera, Geometridae). **[Notes on the biology of *B. bistortata* and the effect of temperature and relative humidity on egg, larva and pupa.]** *Z. angew. Ent.* 42 (3), 1958 (307–15). 12 refs. [G.g.e.] O.H.

In the laboratory experiments described, the larvae accepted foliage of Larch, Sitka Spruce, Poplars, and lettuce, but throve best on Larch. Starving larvae even ate bark from Larch shoots. Optimum conditions were 25° C. and 70–100% r.h., temperatures affecting speed of development of all stages, and r.h.—mortality and vigour.

3460. HUSSON, R. Les ennemis naturels de l'*Ennomos quercinaria* (Hfn). lors de sa récente pullulation en Sarre. **[The natural enemies of *E. quercinaria* during its recent outbreak in the Sarre.]** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (437–40). 22 refs. [F.f.] P.R.

Discusses birds, insect parasites of eggs, larvae and pupae, and the virus disease that caused the collapse of the outbreak. Tachinids were the most important parasites, *Ctenophorocera pavida* being the most frequent. [Cf. *F.A.* 17 No. 3040.]

3461. NEILSON, M. M., and CUMING, F. G. **Egg parasitism of the fall cankerworm [*Alsophila pometaria*].** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (6), 1958 (1).

In a number of collections made during infestations in Nova Scotia, 90–97% of egg masses were found to be parasitized. Two species of parasite, *Euplectrus mellipes* and *Telenomus alsophilae*, were identified. This abnormally high parasitization associated with a sudden fall in population strongly suggests that the parasites were a major factor in terminating the outbreak.

3462. **Population trends of some common loopers (Geometridae) on Douglas Fir, 1949–1956, in the Okanagan-Shuswap Area.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (5), 1958 (2–3).

Analyses Forest Insect Survey data for 6 species, which appeared to fall into 3 classes with quite different curves based on % recovery for collections made in each of the 8 years concerned: (1) *Lambdina fiscellaria* and *Nepytia canosaria*, (2) *Semiothisa granitata* and *Melanolophia imitata*, and (3) *Nematocampa filimentaria* and *Ectropis crepuscularia*.

3463. SILVER, J. T. **Control operations against phantom Hemlock looper, *Nepytia phantasmaria* Stkr. in British Columbia.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (6), 1958 (3).

An outbreak of this looper on *Tsuga heterophylla* and *Pseudotsuga taxifolia* was largely controlled by aerial spraying with a 10% solution of DDT in No. 1 fuel oil at 1 gal./acre.

3464. BRIMBLECOMBE, A. R. **Control of the Cedar looper.** *Qd. J. agric. Sci.* 15 (3), 1958 (159–60). O.R.E.

Newly established plantations of *Cedrela toona* var. *australis* were severely defoliated by larvae of *Pingasa* sp. Both endrin and DDT (emulsifiable concentrates), when sprayed twice at various dosages, with an interval of 2 weeks, gave good control.

3465. LIU, Y.-F. **[*Orgyia antiqua* and *Erannis ankeraria* on Larch in the Great Hingan Mountains.]** *For. Sci., Peking* 1958 (3), (308–18). 3 refs. [Chin.chin.russ.]

One generation of *Orgyia antiqua* and of *Erannis ankeraria* per annum has been observed in the forest of the Great Hingan Mountains. The larvae of both are found only on *Larix* [*L. gmelinii*?].

3466. WICKMAN, B. E. **Mortality of White Fir following defoliation by the Douglas-Fir tussock moth in California, 1957.** *For. Res. Note Calif. For. Range Exp. Sta.* No. 137, 1958. pp. 4.

Twenty-three ¼-acre plots were established in 1957 to determine the extent of mortality in *Abies concolor* from defoliation by *Hemerocampa pseudotsugata* from 1954 until its control in 1956. Plots were located in lightly, moderately and heavily defoliated areas in the Stanislas National Forest, and first-year results are shown. Final examination will be in 1960.

3467. MASAKI, S. **The effect of temperature on the termination of diapause in the egg of *Lymantria dispar* Linné (Lepidoptera : Lymantriidae).** *Repr. from Japanese Journal of Applied Zoology, Tokyo* 21 (4), 1956 (148–57). 17 refs. [E.e.] I.I.E.

Batches of eggs were subjected to 5° C. for 20 to 160 days before incubation at 26°. After < 40 days' cold treatment, hatchings were practically nil, after 70 days, ca. 50% hatched, and after 90 days ⩾ 80%. Incubation time decreased from 22 to 6·5 days as exposure to cold increased from 70 to 160 days, but not linearly, and the s.d. of incubation time also decreased. When eggs were kept for 80 days at different temperatures, the optimum hatching % lay between 5 and 12°, with lower and upper limits of 0 and 20° respectively. Incubation time was little affected by temperature variation.

3468. RUPÉREZ CUÉLLAR, A. Combate y reducción de la *Lymantria monacha* en España. **[Control and reduction in numbers of *L. monacha* in Spain.]** *Bol. Serv. Plagas For. Madrid* 1 (1), 1958 (95–107). 10 refs. [Span.]

Summarizes the history of infestations and control in Spain from 1926 onwards and gives a short account of operations in 1954 to 1957 in the Montes Universales bordering on the provinces of Guadalaara, Cuenca and Teruel.

3469. RASPOPOV, P. M. Iz praktiki aviahimbor'by s šelkoprjadom-monašenkoj. **[Experience of chemical control of *Lymantria monacha* from the air.]** *Lesn. Hoz.* 11 (5), 1958 (39–41). [Russ.]

An account of control measures in several forest districts in the N.W. Chelyabinsk region, using DDT and BHC dusts. DDT gave better control, and the best times to dust were May 25–June 20 and, in the mountains, from June 1 to 15–18.

3470. TADIĆ, M. D. **Biological control of the fall webworm (*Hyphantria cunea* Dr.) in Europe.** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (855–8). 5 refs. [E.e.] P.R.

A brief report of progress to date with 8 Canadian parasites introduced into Jugoslavia. Both for breeding in the laboratory and acclimatization in the field the detection of secondary hosts presented great, and as yet unsolved, difficulties, complicated by changes in development of hosts and parasites in a different climate. [Cf. *F.A.* 16 No. 4323.]

3471. TADIĆ, M. D. ***Apanteles hyphantriae* Riley, an egg parasite of the fall webworm.** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (859–61). [E.e.] P.R.

Describes chiefly oviposition, and embryonic and post-embryonic development, from observations at the Laboratory of Biological Control at Zemun, Jugoslavia.

3472. VASIĆ, K. Mala topolina sovica (*Nycteola asiatica* Krul.) izbiljna štetočina topolinih kultura. [***N. asiatica*, a serious pest of Poplar plantations.**] *Topola, Beograd* No. 6, 1958 (447–54). 6 refs. [Serb.f.]

Describes the life history of *N. asiatica*, which is widespread through most of Jugoslavia, causing damage to the terminal leaves of young Poplars. Species most attacked are *P. alba*, Black Poplars (particularly *P. nigra* var. *italica*), and the commoner hybrid Black Poplars, of which *P.* × *robusta* is the most resistant. Control can be obtained by applications of DDT, BHC and Na arsenite, and in the early stages Nikotinol.

3473. RUPÉREZ CUÉLLAR, A. **The fight against the Pine processionary moth (*Thaumetopoea pityocampa* Schiff).** Shell, [London]. [1958?] pp. 12. Transl. from [*Publ.*] *Serv. Plagas For., Madrid* No. 3 *B.* [See *F.A.* 19 No. 4539.]

3474. TORRENT, J. A. Tratamientos de la procesionaria del pino (*Thaumetopoea pityocampa* Schiff.). [**Control of *T. pityocampa.***] *Bol. Serv. Plagas For., Madrid* 1 (2), 1958 (65–80). [Span.]

Reviews mechanical and chemical methods of control and presents in tabulated form a summary of recommended chemical control measures.

Coleoptera

See also Nos. 2732–3, 2813, 2956, 3052, 3177, 3389–92, 3394, 3400, 3402–4, 3406, 3410, 3429.

3475. PALM, T. Några plantskadegörare på Böda kronopark (Col.). [**Some beetles damaging plants in Böda state forest.**] *Entomologisk Tidskrift, Stockholm* 79 (1/2), 1958 (22–8). [Sw.g.] O.R.S.

Species killing 2- to 3-year seedlings of Pine were *Hylastes opacus*, *Ernobius nigrinus* and *E. longicornis*, *Magdalis duplicata* and *M. frontalis*. The *Ernobius* spp. are considered of only secondary importance in forestry, the other three species as primary attackers. Control methods are discussed.

3476. BINAGHI, G. Su uno sviluppo massivo ed eccezionale di *Haltica saliceti* Wse. (Col. Chrys.) a carico della quercia (*Quercus robur* L.). Morfologia ed etiologia dei vari stadi. [**A heavy and exceptional infestation of *Q. robur* [in Liguria] by *H. saliceti*. Morphology and aetiology of the various stages.**] *Bolletino del Laboratorio di Zoologia Generale e Agraria, Portici* 33, 1956 (493–512). [It.it.] I.I.E.

The hibernating adults emerge in May and deposit their eggs on the underside of Oak leaves. Larval development follows in June–July, and pupation (in the earth) at the end of July. The pupal stage lasts for 8–12 days, and the emerging adults feed voraciously on Oak leaves during August. Spraying with preparations of Pb arsenate at the end of May proved the most effective method of control.

3477. PLAVŠIĆ, V. Prilog poznavanju života i rasvića velike topoline buba-listare (*Melasoma populi L.*). [**The life and development of *M. populi*.**] *Topola, Beograd* No. 6, 1958 (463–8). 2 refs. [Serb.f.]

Laboratory experiments showed the minimum temperature at which *M. populi* can develop to be 13° C., while its optimum temperature is 19–21°, i.e. the prevailing spring temperature in Serbia. Control measures should therefore be taken in spring while it is most active. The high summer temperatures are less favourable to its development, and damage is less.

3478. IRVINE, C. J. ***Paropsis pustulosa*—leaf beetle.** *Plantat. tech. Pap. For. Comm. Vict.* No. 5, 1958 (23–4). 3 refs.

Description and life cycle of a defoliator of *Eucalyptus cladocalyx*.

3479. CURRY, S. J. **Report on entomological research: *Oemida gahani* Dist.** *Rep. For. Dep. Kenya 1955/1957*, 1958 (21–2).

Observations of attack by *O. gahani* on Cypresses indicate that attack is very variable in a forest area; e.g. one plantation at Elburgon showed 75% of thinnings attacked, whereas the general level in the area was 5–20%. Inefficient *shamba* cleaning before planting, leaving infested stumps from which attack would spread, is thought to be the probable reason for this high rate of attack; thinnings from plantations established on grassland have so far shown no sign of attack. The youngest plantation yet found to be attacked was 7 years old, and if further large-scale examination of first thinnings and samples from younger plantations confirms this result, the limitation of pruning to the period of immunity before age 7 could be a simple method of greatly reducing the likelihood of attack. [Cf. *F.A.* 20 No. 3177.]

3480. ACATAY, A. *Phoracantha semipunctata* Fabr. (Col. Cerambycidae) in der Türkei. [***P. semipunctata* in Turkey.**] *Anz. Schädlingsk* 32 (1), 1959 (4–5). 3 refs. [G.]

P. semipunctata, a secondary pest of Eucalypts, was found on felled stems in coppice Eucalypt forest on drained marshland in S. Anatolia. Notes on the habits and life history of the beetle are presented. Infestations may be met by setting trap trees.

3481. BELLIS, E. DE. La lotta contro la saperda del pioppo. [**Control of *Saperda carcharias*.**] *Cellulosa e Carta* 9 (9), 1958 (8–10). [It.f.e.g.]

Satisfactory protection was given to two plots of young Poplars (3 and 6 years old) by brushing on to the stems from ground level to breast height an emulsion of parathion in water (300 or 600 g. active principle per 100 litres).

3482. MAKSIMOVIĆ, M. Ogledi suzbijanja larvi male topoline strižibube (*Saperda populnea* L.) sistemičnim insekticidom. [**Experiments in controlling *S. populnea* by systemic insecticides.**] *Topola, Beograd* No. 6, 1958 (497–502). 3 refs. [Serb.f.]

Experimental spraying of 2- to 3-year-old Poplar plantations with C-570 (20% phosphamidon) in July 1956 and July 1957 at concentrations of 0·2 to 0·7% gave maximum control (63·4% mortality) at 0·5%. Stronger concentrations gave less control, and it is assumed that the effectiveness of the preparation was reduced by the strong insolation and high temperatures at the time of application. No data were obtained on the sensitivity of the different larval stages to the chemical.

3483. ZIVOJINOVIĆ, S., and TOMIĆ, D. Ogledi hemiskog suzbijanja male topoline strižibube (*Saperda populnea*). [**Chemical control of *S. populnea*.**] *Topola, Beograd* No. 4, 1957 (277–88). 4 refs. [Serb.f.]

Poplar cuttings with galls of *S. populnea* were cut in May 1956, and kept in water. One day after the larvae first began to emerge, 15 cuttings were treated with each of several preparations. Dusts proved more effective than sprays, the best control (100% kill in 2 days) being given by Pb arsenate; the next best were Gamadin (BHC-type) and Dilidin (DDT/γBHC mixture).

3484. WACHTENDORF, W. Massenüberwinterung des Fichtenquirllausrüsslers *Anthribus nebulosus* Forst. in Eichenrinde (Col., Anthribidae). [**Mass overwintering of *A. nebulosus* in the bark of Oaks.**] *Anz. Schädlingsk.* 31 (11), 1958 (170–1). 8 refs. [G.]

In 1954 in Nordholz, and again in 1956 in the same place, in a clearing of a Spruce stand, populations of *A. nebulosus* were found overwintering in the bark of Oak trees (*Quercus sessiliflora*).

3485. SCHWENKE, W. Zur Bionomie und Gradologie des grossen braunen Rüsselkäfers *Hylobius abietis* L. [**The bionomics and population fluctuations of *H. abietis*.**] *Beitr. Ent.* 6 (3/4), 1956 (245–73). 20 refs. [G.g.] O.H.

Includes a discussion of the distinctions between *H. abietis* and *H. pinastri*. During a latency period, more beetles were found in *Vaccinium*-type Pine stands near Berlin, than in *Dicranum*-type stands but no difference in population as between plantations 1–5 and 6–10 years old.

3486. SPEERS, C. F. **Effectiveness of three concentrations of aldrin on Pales weevil control methods.** *Res. Note Stheast. For. Exp. Sta.* No. 124, 1958. pp. 2. 2 refs.

Tests using concentrations of 2, 1 and 0·5% for dipping and spraying, and 3, 2 or 1 teaspoonful for granular application [cf. *F.A.* 20 No. 2099] indicated that the lower concentrations, giving somewhat less protection, may be preferable economically except for the dip treatent, where the cost of the 2% solution required is only $0.28/acre.

3487. THATCHER, R. C. **Preplanting dips reduce weevil damage to Pine seedlings.** *J. econ. Ent.* 51 (6), 1958 (915–6). 5 refs.

[Cf. *F.A.* 18 No. 667.] Effective, cheap, and adequately non-phytotoxic control of *Hylobius pales* and *Pachylobius picivorus* is obtained by dipping the top only into a BHC suspension or the whole seedling into an emulsion of aldrin or heptachlor or a suspension of dieldrin—all at 1%.

3488. HALL, R. C. **Pine reproduction weevil.** *For. Pest Leafl. U.S. For. Serv.* No. 15, 1957. pp. 4.

Covers range, hosts, symptoms of infestation, development and life history, natural and chemical control, of *Cylindrocopturus eatoni*. In natural conditions, only *Pinus ponderosa* and *P. jeffreyi* are attacked, but in experimental plantations many other Pines.

3489. FINNEGAN, R. J. **The Pine weevil, *Pissodes approximatus* Hopk., in southern Ontario.** *Repr.* from *Canad. Ent.* 90 (6), 1958 (348–54). 12 refs.

Life history, seasonal history, habits and controlling factors of *P. approximatus*, a weevil that has shown a marked increase in southern Ontario in late years, especially in pure stands of *Pinus sylvestris*.

3490. GRIFFITH, A. L. **A list of *Eucalyptus* species known to be attacked by the snout beetle *Gonipterus scutellatus* (Curculionidae).** *E.A.A.F.R.O. For. tech. Note E. Afr. agric. For. Res. Organ.* No. 9, 1958. pp. 3. 4 refs.

Lists 23 species, planted at Muguga, near Nairobi, as: (*a*) 6 apparently immune, (*b*) 10 slightly, and (*c*) 7 severely attacked. Comparison with a similar classification of 96 species from S. Africa (1927) shows all the Kenya class (*a*) in agreement, but 2 and 3 species of class (*b*) and (*c*) respectively are upgraded and one of class (*b*) is downgraded.

3491. CURRY, S. J. **Ambrosia beetles [in Kenya].** *Rep. For. Dep. Kenya 1955/1957*, 1958 (22–3).

Only two species of exotic softwoods have so far been found to be attacked by ambrosia beetles, and then only after death. These were *Pinus radiata* and *P. halepensis*, after death due to Armillaria root-rot. Of indigenous plantation species, *Polyscias kikuyensis* was found to be the most susceptible in all areas, and the exotic hardwood, *Grevillea robusta*, was also found to be attacked after felling. The heaviest and most sustained ambrosia-beetle attack may be expected in areas where a high but well-distributed annual rainfall is combined with comparatively high mean temperatures. The most effective protection for logs was afforded by insecticides containing 2% γBHC, which gave complete protection for 3 months. Lower concentrations of BHC and similar formulations of dieldrin proved much less effective.

3492. CHARARAS, C. Rôle attractif de certains composants des oléorésines à l'égard des Scolytidae des résineux. [**The attraction of some constituents of oleoresins to Scolytidae attacking conifers.**] *C.R. Acad. Sci., Paris* 247 (19), 1958 (1653–4). [F.f.] O.R.S.

Laboratory experiments showed that α-pinene, β-pinene and terpineol, all repellent in high concentrations, are attractive in dilute concentrations—3–5‰ for *Ips typographus*, 2–3‰ for *Hylurgops palliatus* and 1–2‰ for *Dryocoetes autographus*. A mixture containing equal quantities of the three substances at concentrations of respectively 3, 3 and 2‰ attracted 72% of *I. typographus*, but the addition of other substances extracted from conifers (*n*-undecane, camphene and borneol) reduced the number to 17%. These latter substances all repelled the insects, and abietic acid, lævopimaric acid and rosin failed to attract them. Field experiments with traps in the Haute-Savoie Spruce and Fir forests confirmed the attraction of α- and β-pinene and terpineol.

3493. HALL, R. C. **Environmental factors associated with outbreaks by the Western Pine beetle and the California five-spined Pine engraver in**

California. *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (341–7). 1 ref. [E.e.] P.R.

Reports on a study of mortality in Ponderosa Pine, conducted in 4 of the 5 insect hazard zones classified by Miller *et al.* [cf. *F.A.* 3 p. 344]. Losses caused by *Dendroctonus brevicomis* were significantly correlated with mean daily temperature, and precipitation deficiencies during spring, and soil moisture deficiencies in mid-July, those of *Ips confusus* with precipitation deficiencies in spring and summer, and breeding material left after spring logging. These correlations have been used in predicting losses. *From author's summary.*

3494. WYGANT, N. D. **Engelmann Spruce beetle control in Colorado**. *Repr.* from *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (181–4). 6 refs.

Describes recent outbreaks, chemical control operations and the effects of natural enemies, particularly woodpeckers and parasitic nematodes. [Cf. *F.A.* 15 No. 3826; 17 No. 4232.]

3495. KNIGHT, F. B. **The effect of woodpeckers on populations of the Engelmann Spruce beetle [*Dendroctonus engelmanni*]**. *J. econ. Ent.* 51 (5), 1958 (603–7). 5 refs.

Survival of beetles per half sq. foot (to just before emergence) inside and outside wire-gauze cages was studied on 225 trees from 10 infested areas. Woodpecker activity was rated visually into 5 classes. Where feeding was heavy, mean reduction in beetle populations outside the cage was 98%, where it was light, 45%. Feeding intensity increased with infestation intensity. The highest numerical survivals were found where feeding was light to moderate.

3496. ALLEN, D. G., MICHAEL, R. R., and STONE, S. A. **Sounds of Douglas Fir beetle activity . . . recorded and interpreted . . . equipment techniques**. *Res. Note Ore. For. Lds. Res. Cent.* No. 36, 1958. pp. 19.

The first part describes experiments in which the sounds made by *Dendroctonus pseudotsugae* (chirping, chewing etc.) were listened to, recorded, and oscillographically photographed, partly in correlation with visual observations of beetles in galleries partly exposed and covered with transparent plastic. The second part discusses electronics and acoustics, distortions by patterns in the microphone etc. The methods are thought to deserve development on both scientific and commercial grounds. [Cf. *F.A.* 16 Nos. 1137–8.]

3497. WALTERS, J. **A system of indirect control of the Douglas Fir beetle *Dendroctonus pseudotsugae***. *Abstr. of thesis*, in *For. Chron.* 34 (3), 1958 (326–7).

Develops a classification of 4 age groups and 4 vigour classes for determining the susceptibility of Douglas Fir stands to beetle attack. Older, slow-growing trees (e.g. > 150 years old with a 10-year diam. growth of < 11 mm.) are the most susceptible. [Cf. *F.A.* 16 No. 4338.]

3498. MINKO, G. ***Hylastes ater* Payk. in Ovens Plantation**. *Plantat. tech. Pap. For. Comm. Vict.* No. 5, 1958 (20–3 + 2 photos). 3 refs.

Describes life history and control of *H. ater*, which usually occurs only in slash, but has recently been found attacking the roots of young regeneration of *Pinus pinaster*.

3499. CHAPMAN, R. F. **Notes on the biology of *Hylesinus fraxini* (PZ) (Col. Scolytidae)**. *Ent. mon. Mag.* 94 (1134), 1959 (245–7). 7 refs.

A note on the bionomics, gallery formation etc. of beetles found in Ash logs in Essex in May. The first adults were obtained on 13th July. *H. fraxini* is probably bivoltine in Britain.

3500. MICHALSKI, J., and SZMIDT, A. Spostrzeżenia co do niektórych metod zwalczania cetyńców. [**Observations on some methods of controlling *Myelophilus* spp.**] *Sylwan* 101 (7), 1957 (55–62). 4 refs. [Pol.]

Tabulates data on *M. piniperda* and *M. minor* populations on trap-trees and stacked poles in 1955–56 in Potasze forest district, Poland.

3501. AL-AZAWI, A. F., and CASIDA, J. E. **The efficiency of systemic insecticides in the control of the smaller European Elm bark beetle [*Scolytus multistriatus*]**. *J. econ. Ent.* 51 (6), 1958 (789–90). 10 refs.

Of the organophosphates introduced into the stem of the living tree, only Chipman R-6199 (at 8 g./tree), gave marked control. Demeton, dimefox and Thimet were inferior, though superior in laboratory tests. The efficiency of Chipman R-6199 in the intact tree is ascribed to its localization in cortical tissues. None of these systemic poisons was as effective as DDT in beetle control and the prevention of beetle feeding.

3502. FOX, R. C. **Seasonal development of the smaller European Elm bark beetle in Southern Michigan**. *Quart. Bull. Mich. agric. Exp. Sta.* 41 (2), 1958 (279–87). 4 refs.

Field studies in 1955–57 showed that *Scolytus multistriatus* had 2 generations p.a.; the first began to emerge in late May, with a peak on June 10th, the second began in early July, with peak emergence in late July to early August.

3503. CHAPMAN, J. A. **Studies on the physiology of the ambrosia beetle *Trypodendron* in relation to its ecology**. *Repr.* from *Proc. 10th int. Congr. Ent., Montreal 1956*, Vol. 4, 1958 (375–80). 13 refs.

Laboratory studies of flight capacity of *T. lineatum* showed that continuous flights of several hours are possible, and indicated a difference in capacity, or inclination, to fly, between beetles seeking logs and those flying to overwintering sites. Response to a flight stimulus during adult life is closely related to condition of indirect flight muscles, which go through a marked but temporary change during the brood-establishment period. Several hundred beetles were dissected to study changes in digestive, reproductive, and other organs during adult life. The high proportion of old ♀s found in samples of overwintered populations suggests that many ♀s carry out more than one attack/overwintering cycle. It is considered that an adult diapause occurs in this species. *From author's abstract.*

3504. CHAPMAN, J. A., and KINGHORN, J. M. **Studies of flight and attack activity of the ambrosia beetle, *Trypodendron lineatum* (Oliv.), and other scolytids.** *Repr.* from *Canad. Ent.* 90 (6), 1958 (362–72). 13 refs.

Describes methods used to study the influence of weather, season, and other factors, on the flight of *T. lineatum* and, to a lesser extent, of other scolytids. Some of the data obtained are presented. Heavy attack flights may be expected when the air temperature exceeds 60° F. after most of the snow has melted. Early warm periods may cause first flight activity to occur simultaneously over a wide range of altitudes. On the other hand, attack flights may occur over a period of several weeks, at different altitudes, if warming is gradual, or if some snow cover remains after the air is warm enough for flight. *T. lineatum* flights are preceded in the spring by the appearance of *Pseudohylesinus nebulosus*.

3505. CHAPMAN, J. [A.] **Response of *Trypodendron* to forest litter.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (5), 1958 (3–4).

A number of field and laboratory studies failed to reveal any consistent behaviour in adults of *Trypodendron lineatum* in the choice of dry vs. moist litter, or burrowing vs. flying away, when given the opportunity of burrowing into litter, which is their normal method of hibernation.

3506. GIBSON, C., KINGHORN, J. [M.], and CHAPMAN, J. [A.] **Ambrosia beetle brood productivity.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (5), 1958 (2).

Studies were made of 300 galleries of *Trypodendron lineatum* in Douglas Fir logs felled the previous year and lying in the forest. Galleries on the underneath or shaded sides of logs were longer and more numerous than those on exposed or sunny sides, and contained more egg niches with a higher pupal survival rate. There was some indication that number of eggs and pupae and % survival were greater in young (25- to 30-year) than in old (ca. 200-year) logs.

3507. SCHÖNHERR, J. Die Dämpfung, ein Weg zur Entseuchung des vom Nutzholzborkenkäfer (*X. lineatus*) befallenen Holzes. **[Disinfestation of logs attacked by *Xyloterus lineatus* with steam.]** *Forst u. Jagd* 8 (5), 1958 (227–8). 4 refs. [G.]

[Cf. *F.A.* 12 No. 759.] Describes experimental treatment for 5, 15 and 30 min. in a portable plant at 1·3 atm. With 5 min., all beetles and broods of *Ips typographus* were killed to a depth of 20 mm. With 15 min., only a few pupae of *X. lineatus*, lying deeper than 25 mm., survived. An increase of pressure to 1·5 atm. (not feasible with this plant) would probably kill 100%. Heat penetration to 3–4 cm. and treatment in late May to early June is advised. The 5-min. treatment cost (1955) DM.10/cordwood cu.m. (*Schichtfestmeter*) and the 15-min. about double.

3508. GRAHAM, S. A. **Problems caused by insects in Lake States forest plantations.** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol 4, 1958 (261–72). 2 refs. [E.e.] P.R.

Includes some unpublished data from field and laboratory investigations on chafer-grub populations in Pine plantations, predominantly *Pinus resinosa* and *P. banksiana*, in relation to region, vegetation, soil, etc., food preferences of larvae and adults, and relative injuriousness of species. Of the larger grubs, mostly *Phyllophaga*, *P. marginalis* and *Cotalpa lanigera* appeared to be relatively harmless, of the smaller, *Serica* and *Diplotaxis* spp. potentially harmful. Population densities were directly related to the proximity of food plants for the adults, especially Birches, Poplars, Oaks, and some shrubs.

3509. GERSDORF, E. Zum Auftreten des Maikäfers in Niedersachsen. **[The cockchafer in Lower Saxony.]** *Z. angew. Ent.* 42 (4), 1958 (401–8). 5 refs. [G.g.e.] O.H.

In most regions where cockchafers (mostly *Melolontha melolontha*) occur, definite flight years can be observed, but these are not quite regular. This is attributed to the usual 4-year development period curtailed by certain weather conditions, e.g. the hot and dry summers of 1947 and 1948.

Hymenoptera

See also Nos. 2734–6, 3383, 3390, 3394.

3510. FORSSLUND, K. H. **On some parasites of the sawfly *Diprion* (*Microdiprion*) *pallipes* Fall. in Sweden (Hym. Parasitica).** *Entomologisk Tidskrift, Stockholm* 78 (4), 1957 (274–5). [E.] O.R.S.

Discusses the biology of *Rhorus substitutor*, an important parasite in N. and Central Sweden, and describes briefly *Aptesis basizonius*, *Adelognathus tetracinctorius*, *Gelis* sp., *Exenterus simplex*, *Hypsantyx lituratorius*, *Lamachus longiventris* and *Holocremnus frutetorum* reared from *D. pallipes*.

3511. GRIFFITHS, K. J. **Host tree preferences of adults of *Neodiprion lecontei* (Fitch.).** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (5), 1958 (1).

Observations made during an outbreak in 1955–56 in Ontario showed that only *Pinus resinosa* was attacked and only one generation occurred per year. Open-grown trees were preferred to close-grown for oviposition. These findings differ from those of Benjamin in the U.S.A. [cf. *F.A.* 17 No. 1814].

3512. KRIEG, A. Latente und akute Infektionen mit Insekten-Viren. **[Latent and acute infections with insect viruses.]** *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (737–40). 13 refs. [G.g.] P.R.

A general discussion of the problem, with illustrations from the viruses of *Neodiprion sertifer* and *Bombyx mori*. Experimental provocation of virus disease on the former by ultra-violet rays, thioglycolic acid, NaF and hydroxylamine succeeded on populations from two sites in Germany, where the virus is apparently endemic, but not on carefully bred, healthy laboratory specimens. [Cf. *F.A.* 18 No. 3143.]

3513. NIKLAS, O. F. Die Erzwespe *Tetracampa diprioni* Ferrière als Eiparasit der Kiefernblattwespe *Neodiprion sertifer* Geoffr. **[*T. diprioni* as an egg**

parasite of *N. sertifer*.] *Beitr. Ent.* 6 (3/4), 1956 (320–32). 15 refs. [G.g.] O.H.

Describes morphology and biology of all stages, and the bionomics of the parasite, collected near Darmstadt, in connexion with the bionomics of *N. sertifer* and other hosts (*Diprion pini* and *D. simile*). The parasites, which are bivoltine,are not considered likely to increase sufficiently in epidemics of univoltine diprionids to exercise marked control.

3514. OHNESORGE, B. Das Austreiben der Fichten und ihr Befall durch die kleine Fichtenblattwespe *Pristiphora abietina* (Christ). **[Flushing of Spruce and *P. abietina* attack.]** *Forstwiss. Cbl.* 77 (11/12), 1958 (335–47). 14 refs. [G.]

The coincidence of Spruce flushing with oviposition by *P. abietina* (which can lay its eggs only in opening buds) was investigated in several parts of E. and W. Germany. The influence of stand age on flushing, and the influence of stand type, weather, site, and general climate on the temporal coincidence or otherwise of flushing and hatching are discussed with special reference to the Cloppenburg forest district [cf. *F.A.* 13 No. 3186].

3515. NAIRN, L. D. **The importance of adventitious growth in Tamarack.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (6), 1958 (2–3).

After several years of heavy Larch-sawfly attack or flooding, the upper crown of Tamarack [*Larix laricina*] may die back entirely and the lower crowns partially. Recovery of many of these trees is due to the production of adventitious shoots, especially along the main stem. On a vigorous tree, these shoots may develop into branches > 12 in. long within 2–3 years. Two trees were studied in detail: tree A from a stand where defoliation had been moderate to severe over the past 8 years and tree B from a stand where periodic severe flooding had occurred, with only slight defoliation, over 10 years. It was found that 60% of the total foliage and 75% of the shoots on A were of adventitious growth; for B, the corresponding figures were 24% and 33% respectively. This extensive production of adventitious shoots is apparently a major factor in supporting high Larch-sawfly populations even after considerable branch mortality due to defoliation. Adventitious shoots are undoubtedly equally important in keeping trees alive after severe branch-killing due to flooding.

3516. IVES, W. G. H. **Foliage and shoot production of Tamarack as factors in population studies of the Larch sawfly, *Pristiphora erichsonii* (Hartig).** *Repr.* from *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (407–16). 7 refs.

A preliminary investigation on developing a foliage-sampling method for estimating Tamarack (*Larix laricina*) foliage production as a factor in population studies of the Larch sawfly. Weight of foliage per fascicle differed between branch sections for some branches, but showed no consistent trends. Fascicle weight was less in the upper portions of the crown than in the lower, and increased as the season progressed. Weight of foliage per branch differed between crown levels and had large variability within a crown level; adjustment for branch size reduced the coefficient of variation. The shoot/foliage ratio differed between trees and was greatest in the upper portions of the crowns. Little relationship existed between mean shoot length and mean fascicle weight. Foliage length was closely related to foliage weight, and a bimodal intra-fascicle frequency distribution of needle length was similar in shape for a wide range of fascicle weights. Whole branch samples of foliage, adjusted for branch size, are the most promising survey method for estimating foliage production, and can be used in conjunction with estimates of sawfly populations. Estimation of foliage and shoot production on an area basis is the most promising method for life-table studies. This method is most useful since populations of different stages of the Larch sawfly can all be given on this basis. *From author's abstract.*

3517. IVES, W. G. H., and PRENTICE, R. M. **A sequential sampling technique for surveys of the Larch sawfly.** *Repr.* from *Canad. Ent.* 90 (6), 1958 (331–8). 9 refs.

A plan outlined in an earlier publication [cf. *F.A.* 16 No. 1945] is modified in accordance with new data. Infestation classes are based on the proportion of the shoots used for oviposition and the % of defoliation.

3518. BUCKNER, C. H. **Mammalian predators of the Larch sawfly [*Pristiphora erichsoni*] in Eastern Manitoba.** *Repr.* from *Proc. 10th int. Congr. Ent., Montreal 1956* Vol. 4, 1958 (353–61). 13 refs.

[Cf. *F.A.* 17 Nos. 653, 1817.] The small mammal species frequenting sawfly-infested Tamarack [*Larix laricina*] stands are listed. The most important are the shrews *Sorex cinereus*, and *S. arcticus* and the voles *Clethrionomys gapperi* and *Microtus pennsylvanicus*. All four of these reject dead cocoons and cocoons attacked by a fungus. *S. cinereus* and *C. gapperi* also reject cocoons parasitized by the tachinid, *Bessa harveyi*, to some extent. Predation under field conditions was estimated by using the 'cocoon planting' technique. Although the insect spends a large part of the year within a cocoon in the soil, most of the predation is exerted in September and October at the time of peak populations of small mammals. Total cocoon predation ranged from 37 to 98% and was usually > 75%. Shrews, though less numerous, destroyed more cocoons than mice did. *From author's abstract.*

3519. MANDL, L. Zwei neue Blattgallenerreger auf *Acer pseudoplatanus*. **[Two new causes of leaf-galls in *A. pseudoplatanus*.]** *Bollettino del Laboratorio di Zoologia Generale e Agraria, Portici* 33, 1956 (162–8). [G.] I.I.E.

Describes galls caused by *Aulogymnus aceris* and *Dichotomus acerinus* on *A. pseudoplatanus* in the Wienerwald.

Diptera

See also Nos. 3391–2.

3520. JOHNSON, N. E., and HEIKKENEN, H. J. **Damage to the seed of Douglas-Fir by the Douglas-Fir cone midge.** *For. Sci.* 4 (4), 1958 (274–82). 9 refs.

Describes with drawings, the morphology, biology and damage from *Contarinia oregonensis*, which caused more damage to Douglas Fir seed in W. Washington in 1955–57 than all other cone-infesting insects together. The larva causes the plants to produce a gall round the seed, fixing it to the cone-scale, and the damaged seed usually remains in the cone during natural seed-fall or seed extraction. An accurate estimate was obtained of the % of galled seed within a cone by cutting it through the axis and counting the exposed seeds. Sampling cones by this method from 44 areas in W. Washington showed 14% of all seed to be damaged by *C. oregonensis*; in one area the damage averaged 49%.

3521. KRÄMER, K. Gallmücken als Kätzchen-Schädlinge an Weiden. **[Gall flies attacking catkins on Willow.]** *Anz. Schädlingsk.* 31 (12), 1958 (188). [G.]

In the region of Rödelheim, catkin buds of *Salix smithiana*, prematurely emergent in November, were found to have been killed by larvae of *Rhabdophaga heterobia*. In the same district heavy infestations of *Tuberolachnus salignus* and of an unidentified gall mite, were also observed on the same species.

459. Other Animals

See also Nos. 3098–9, 3392.

3522. BERKER, J. Die natürlichen Feinde der Tetranychiden. **[The natural enemies of tetranychids.]** *Z. angew. Ent.* 43 (2), 1958 (115–72). 81 refs. [G.g.e.] O.H.

A study of arthropod predators of species of *Metatetranychus ulmi* found on fruit trees, *Schizotetranychus schizopus* on Willows, and *Eotetranychus telarius* on Lime trees, describing 59 species, mostly polyphagous. No parasites or diseases of any stages of the mites were observed.

3523. **Saving the Lindens on Bahnhofstrasse [, Zurich].** *Trees Mag., Ohio* 18 (6), 1958 (11, 16, 22).

Describes the successful control of an infestation of spider mites [? *Tetranychus tiliarius*] on an avenue of *Tilia* sp. by spraying with Kelthane, a miticide developed by Rohm & Haas Co., Philadelphia, which kills phytophagous mites of many types without injuring beneficial insects, and which has a long residual action.

46. Damage by Man

See also Nos. 2961, 3180, 3243.

3524. FANTA, J. Význam a ekonomické zhodnocení škod přibližováním na stojícím porostu. **[The importance and economic evaluation of skidding damage.]** *Sborn. čsl. Akad. zeměd. (Lesn.)* 4 (12), 1958 (1053–64). 16 refs. [Cz.cz.russ.g.]

Investigations showed that, in an area of 1·68 ha. in a 118-year-old Spruce forest on a slope of 13–17° or steeper in the Orlické mountains, 51·5% of all standing trees, and on the lower part of the slope 80%, showed skidding damage. In 22 trees damaged by skidding from 5 to 38 years previously, decay had spread to a mean height of 1·8 m., and had degraded 16·1% of the wood. It is estimated that in this particular case the financial yield of the stand has been reduced by 7·3% as a result of skidding damage.

3525. DAWKINS, H. C. **Further measurements of felling damage in tropical high forest.** *Tech. Note For. Dep. Uganda* No. 6 (58), 1958. pp. 2. 2 refs.

A silviculturally treated area with no climbers and 50% freedom from understorey was examined for damage by normal commercial exploitation (tractor hauling with and without crawler arches). Over the 33·6 acres, 144 trees (girth above buttresses (g.a.b.) 5–14 (mean 7·5) ft., and height 80–160 (mean 120) ft.) were felled, causing 4·92 acres of complete devastation and knocking down 94 of 369 labelled desirable young trees. Logging tracks were 13 ft. wide and ca. 2·5 miles long. The damage done by exploiting 4·3 trees/acre was: for felling 0·034, and logging 0·028, a total of 0·062 acre/tree or 26% of the area, which is in close agreement with the 25% loss of young trees. The felling damage is only 34% of that found on an untreated block with a mass of climbers and understorey and with larger timber trees (mean g.a.b. 9–10 ft.). The data support the published estimate of 0·05 acre/tree total devastation as a mean figure for planning silviculture in tropical high forest.

3526. NICHOLSON, D. I. **An analysis of logging damage in tropical rain forest, North Borneo.** *Malay. Forester* 21 (4), 1958 (235–45). 3 refs.

Assessment of 108 acres of tractor-logged forest showed that 53% of trees of commercial species suffered some damage, but that on only 45% was it serious. Broken or fallen trees constituted the largest damage class. Bark damage occurred on relatively few trees but its effect was believed to be serious. There was a close relationship between b.a. (and volume) extracted and the amount of damage. *From author's summary.*

48. Injuries Due to Unknown or Complex Causes

See also Nos. 2756, 2764, 3332, 3334.

3527. LEAPHART, C. D., COPELAND, O. L. JR., and GRAHAM, D. P. **Pole blight of Western White Pine [*Pinus monticola*].** *For. Pest Leafl. U.S. For. Serv.* No. 16, 1957. pp. 4. 7 refs.

3528. HANCOCK, W. V. **Studies on *Europhium trinacriformis* sp. nov., the perfect stage of a species of *Leptographium* isolated from lesions on Western White Pine affected with pole blight.** *Abstr. of thesis*, in *For. Chron.* 34 (3), 1958 (328–9).

E. trinacriformis was isolated from 11% of the lesions on *Pinus monticola* affected with pole blight in the interior region of British Columbia and from 84% of affected trees in the coastal region. The fungus probably gained entrance to lesions already formed and occasionally extended them.

3529. CLARK, J., and BARTER, G. W. **Growth and climate in relation to dieback of Yellow Birch.** *For. Sci.* 4 (4), 1958 (343–64). 44 refs.

Brings together and examines material from various published sources on dieback of *Betula*

lutea, its spread, and its relation to climatic factors [cf. *F.A.* 19 No. 714; 18 No. 3771]. Dieback reduces growth simultaneously throughout the tree, so increment at d.b.h. was taken as a measure of growth behaviour. Growth, which is made mainly in June–August, varied directly in this period, both before and during the onset of dieback, with the net water-balance (i.e. the difference between potential and actual evapo-transpiration, calculated from precipitation, temperature and soil-moisture storage), indicating a quick response by Birch to available moisture. The sudden fall in annual increment during dieback could not, however, be explained by climatic data. Whereas vigorous trees and stands showed the least growth reduction during periods of drought, their relative growth during the early years of dieback was reduced much more than that of trees of low vigour. These observations, together with data on the direction of spread of the disease and a description of typical virus symptoms [see *F.A.* 18 No. 4370] suggest that Birch dieback is an infectious disease. If a virus is responsible, the actual evapo-transpiration or availability of soil moisture may be important regulating factors.

3530. REDMOND, D. R. **Soil temperatures and Birch decline.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 14 (5), 1958 (1).

In a previous study [cf. *F.A.* 17 No. 1826] of heating soil under a stand of Yellow Birch by means of electric cables, it was shown that an increase of 2° C. in the mean temperature of the soil above that occurring during the growing season caused rootlet mortality to increase from a normal value of 6% to ca. 60%. Only a small proportion of the rootlets in any one tree, however, was affected in this experiment and no decline in the vigour of foliage or twigs could be observed. During 1956–57 heat was similarly applied to an area of soil containing all or most of the root systems of 5 Yellow Birch and 3 White Birch, 8–10 ft. high. Temperature was maintained at 2·8° and 3·5° above that occurring in adjacent areas, throughout the summers of 1956 and 1957 respectively. M.c. of the heated soil was at no time below wilting point. No symptoms of foliage decline appeared during 1956; ca. 40% of twigs on the Yellow Birch failed to elongate during 1957, though the buds had burst normally during the spring. By late Aug. 1957, foliage on one or more branches of each of the Yellow Birches had become chlorotic and fell prematurely, but no twigs were dead. There were no symptoms of decline in White Birch. Examination of the root systems at the end of 1957 showed that > 75% of the rootlets of Yellow Birch and 30–50% of those of White Birch were dead.

3531. MILETIĆ, Ž. Prilog poznavanju uzroka sušenja šuma bukve na Južnom Kučaju. **[The cause of the dying of Beech forests in Južni Kučaj.]** *Šumarstvo* 11 (3/4), 1958 (129–42). 15 refs. [Serb.e.f.]

Considers the dying of Beech on an area of ca. 11,729 ha. of Južni Kučaj, N.E. Serbia, and refers to similar occurrences in other European countries, discussing in detail the dieback of Beech at Langres, France [see *F.A.* 16 No. 4178]. In the light of these observations the author advances the view that the primary cause may be prolonged dry periods, the secondary causes unfavourable soil conditions (shallow permeable limestone), and bad management. He suggests detailed analysis of the prevailing meteorological conditions as a step in further research.

3532. KRSTIĆ, M. 'Krastavost' topola, jedna nezabeležena fitopatološka pojava kod nas. **['Scabbiness' of Poplar, not hitherto reported in Jugoslavia.]** *Topola, Beograd* No. 8, 1958 (667–72). 6 refs. [Serb.f.]

Describes the bark disease called in Germany '*Braunfleckengrind*' [cf. *F.A.* 19 Nos. 2101, 3105] and reports the localities in Serbia where it was found by the author. *P.* × *serotina* was most affected, *P.* × *robusta* and *P.* × *marilandica* less so.

5. FOREST MENSURATION. INCREMENT; DEVELOPMENT AND STRUCTURE OF STANDS. SURVEYING AND MAPPING

3533. FIRAT, F. Dendrometri. **[Dendrometry.]** *Istanbul Üniv. Yay.* No. 775 (*Orm. Fak.* No. 57), 1958. pp. 312. 92 refs. [Turk.]

A textbook on standard lines, with sections on: timber volume measurement; measurement of standing trees; measurement of whole stands; determination of age of trees and stands; determination of tree and stand increment and development.

3534. SUDARMO, M. K. **Mensuration, yield and increment in Indonesia.** [*Docum.*] *2nd Sess. FAO Teak Sub-Comm., Bandung 1957* No. *FAO/TSC* 57/23 [1957]. pp. 2. Limited distribution.

Notes on methods used for selecting and delimiting sample plots, description of trees by crown class, crown form and stem form, for measurement of height, diam., b.a., volume, increment etc.

51. Systems and Units of Measurement

3535. BROWN, G. S. **Log measurement systems in South-East Asia and the Pacific.** [*Docum.*] *4th Sess. FAO Asia-Pacif. For. Comm., Bandung 1957* No. *FAO/APFC*-57/39, 1957. pp. 44. Limited distribution.

Notes, arranged geographically, on all the systems used in the region. Where possible, factors are given for converting the volume units in use into true volume. Canadian and U.S. systems are included.

52. Measurements of Stem Dimensions and Volume of Trees, Stands, Forests and Timber

521. Diameter (Girth) and Sectional Area

See also Nos. 3006, 3558, 3563.

3536. MÜLLER, G. Untersuchungen über die Querschnittsformen der Baumschäfte. 3. Mitteilung. **[Investigations on the cross-sectional shape of tree boles. 3.]** *Forstwiss. Cbl.* 77 (11/12), 1958 (374–81). 6 refs. [G.g.]

[Cf. *F.A.* 20 Nos. 834, 1574.] The mean excentricity of b.a. at b.h. was investigated from measurements of 2137 Spruce stems. B.a. excentricity increased regularly, and the scatter of values systematically, with increasing stem diameter. Investigation of the angle between max. and min. d.b.h. showed that, in the majority of cases, cross-sections were not simply elliptical or ovate, but irregular, determined by the stresses acting on the tree in different directions. Max. diameter showed the direction of the greatest, and min. diameter the direction of least stress. If one direction of stress is particularly prominent, the mean angle between extreme diameters is $> 70°$; with two main directions of stress transecting each other, the mean angle is $< 70°$. Girth measurement gives more accurate results than calipering in calculating increment when the b.a.'s are irregular.

3537. HOLUBČÍK, M. Príspevok k otázke vol'by rozpätia hrúbkového stupňa pre taxačné práce z hl'adiska presnosti a hospodárnosti. [**Choice of diameter-class intervals in enumerations with respect to accuracy and economy.**] *Lesn. Čas.* 4 (6), 1958 (386–429). 79 refs. [Slovak.slovak.russ.g.]

Investigates the influence of diameter-class interval (d.c.i.) on the accuracy of calculations of b.a. and standing volume, using data obtained by calipering 4496 trees (Fir, Beech, Spruce, Pine) on sample plots in selection-type forests, and 395 trees (Spruce, Douglas Fir) in a 70- to 80-year even-aged stand. Errors in b.a. caused by errors in diam. measurement due to irregular tree cross-section showed a non-significant relationship to d.c.i., but were small (ca. $\pm 0{\cdot}2\%$). D.b.h. could be measured with a mean error of $\pm$ 1·5–2 mm., depending on tree species. Rounding off d.b.h. measurements up and down gave a positive error in b.a. of almost 1%, which depended, but not significantly, on d.c.i. Rounding off downwards gave a negative error in b.a. which depended significantly on d.c.i.; the error increased with increasing d.c.i. Cross-sectional excentricity caused a positive error in b.a. of 1–2%. If calipering was done within $\pm$ 10 cm. of b.h., using calipers without a spring, and rounding off d.b.h. both up and down, the accuracy of stand volume calculations depended, but not significantly, on d.c.i. The time required for determining stand volume with a d.c.i. of 2 cm. was $\frac{1}{3}$ less than with a d.c.i. of 1 cm.; with a d.c.i. of 4 cm., $\frac{2}{3}$ less. A d.c.i. > 2 cm. is recommended except in stands where the d.b.h. of the mean tree is < 20 cm.

3538. BITTERLICH, W. Das neue Relaskop. [**A new relascope.**] *Allg. Forstztg.* 69 (23/24), 1958 (295–9). [G.]

Describes an improved model of the mirror relascope made by Optimar of Salzburg, and gives detailed instructions for various measurements [cf. *F.A.* 19 No. 4594].

3539. CLEAR, T. **Some experiences in the survey and inventory of growing stock for forest management purposes.** *Irish For.* 15 (1/2), 1958 (18–25). 13 refs.

Briefly reviews the principal methods of inventory in general use, and gives some account of trial inventories made in Ireland over 10 years. Krenn's modification of Hohenadl's mean-tree method [see *F.A.* 3 p. 172] was found useful and practicable. The angle-count method, using the Spiegel-Relascope, proved disappointing: measurements made under good conditions gave a stand b.a./acre that deviated up to 20% from the calipered measure. It was found that trees could be hidden by others, or small trees might appear to merge as one, especially in dark Spruce stands. The eyes tire readily in winter in heavily stocked pole stands. It is sometimes impossible to use the Relascope in older weed-infested crops of Pine and Larch, and even in Douglas Fir and Spruce, briars and Elder frequently reach well above breast height. It was found very desirable to mark trees first to prevent their being recorded twice—a very real danger.

3540. STÖHR, K. F. Ein Vorschlag zur Erreichung einer höheren Genauigkeit bei Probeflächenaufnahmen nach der Winkelzählprobe. [**Proposal for increasing the accuracy of sampling by the angle-count method.**] *Allg. Forst- u. Jagdztg.* 130 (1), 1959 (23–9). 10 refs. [G.g.e.]

Describes a method to reduce, with little extra effort, the sampling error attributable to lack of homogeneity in the diameter and spacing of trees in a stand [cf. *F.A.* 17 No. 4270] by varying the counting angle as follows: the observer, using as a Relascope a ruler graded in cm. and mm., held 50 cm. from the eye by a handle 50 cm. long, records for all the trees in the count, their apparent width on the scale of the ruler to the nearest mm. These values are squared and multiplied by a factor of $n-\frac{1}{2}$, where n in each case represents the number of trees with equal or greater readings, thus obtaining a number of approximate values of the b.a./ha. The mean of these is taken to be the desired value. Theoretical deductions, examples, and the application of the method to increment determination are discussed.

3541. HUTCHISON, O. K. **Use the 'wedge' with a staff compass.** *Sta. Note Cent. St. For. Exp. Sta.* No. 123, 1958. pp. 2. 1 ref.

For greater ease in angle-count cruising, suggests mounting the glass prism or wedge on a staff compass to help maintain the wedge at right angles to the line of sight.

522. Height, Length

3542. PARDÉ, J. Un nouveau dendromètre français: l'altamètre. [**A new French hypsometer, the Altamètre.**] *Rev. for. franç.* 11 (2), 1959 (104–6). [F.]

Describes an instrument (invented by R. Hannoyer, Paris) based on the principle of rotating mirrors. A reading scale is supplied for distances of 10, 20, and 30 m. from the object, with a nomogram to correct for slope etc. Tests have shown that it is about as accurate as the 'Blume-Leiss', but at present it is dearer.

3543. DISSESCU, R. Determinarea înălţimii arborilor în funcţie de diametrul de bază prin intermediul ecuaţiei de regresie. [**Determination of tree height as a function of diameter at ground level**

by means of a regression equation.] *Rev. Pădurilor* 1958 (7), (419–21). [Rum.russ.g.f.e.]

Develops and explains the use of a regression equation $h = m \log d - n$, applicable to Silver Fir stands of any age, in which h = height, d = diameter at ground level, and m and n are constants.

523. Bark

See Nos. 3200, 3553, 3579.

524. Determination of the Volume of Trees and Stands

524.1. Principles of Volume Determination. Form (Taper)

See also Nos. 3546, 3554.

3544. NEWHAM, R. M. **A study of form and taper of stems of Douglas Fir, Western Hemlock, and Western Red Cedar on the University Research Forest, Haney, British Columbia**. *Abstr. of thesis*, in *For. Chron.* 34 (3), 1958 (333–4).

The main conclusions reached in this thesis (number of stems studied not given) are: that the form of forest tree stems is complex and cannot be ascribed readily to either of the known theories; that the quadratic paraboloid gives a sufficiently good fit over the main part of the stem to be used as a basis for studying taper variation; and that the amount of taper present in a stem varies directly as the square of the d.b.h. and inversely as the total height. The amount of taper appears to increase throughout the life of the tree as long as the tree remains in the dominant crown class. As soon as a tree descends into the codominant class, the rate of increase in taper falls off, and if it descends into the intermediate and suppressed classes, the amount of taper decreases with increasing age. The form of open-grown trees resembles a cone, or a neiloid in some cases, and not the quadratic paraboloid of a close-grown or forest tree.

3545. DITTMAR, O. Formzahluntersuchungen mit dem Ziel der Verbesserung von Holzmassen- und Zuwachsermittlung langfristiger forstlicher Versuchsflächen. **[Investigations on form factors for the purpose of improving volume and increment determination on permanent sample plots.]** *Wiss. Abh. dtsch. Akad. LandwWiss., Berl.* No. 36, 1958. pp. 157 + 3 tbls. 68 refs. [G.g.e.russ.]

The author recommends the use of a modified Hohenadl true form factor, based on the volume determination of 15 instead of 5 equal stem sections to determine the artificial form factor required for the Eberswalde method of volume determination by diameter classes, developed by Schwappach and Fricke. A virtually linear relationship was found to exist in each stand between d.b.h. and $d_{0.9}$, allowing graphic determination of the latter. The modified method gave results within 2% of true values measured on the ground. [Cf. *F.A.* 19 No. 4601.] In the course of these investigations, it was observed that form factors in moderately thinned middle-aged Spruce stands in the Harz were greater than in heavily thinned stands, and that significant differences existed in the stem forms of the Pine provenances tested at Chorin, now 47 years old, the local provenances tapering least, and the Scottish and Rheinpfalz provenances most.

524.3. Volume of Tree Groups and Stands

See also No. 2991.

3546. CHRISTIE, J. M. **Alignment charts and form height tables for determining stand volumes of conifers, Oak and Beech**. *For. Rec. For. Comm., Lond.* No. 37, 1958. pp. 18. 5 refs.

Includes (1) tables of form height, (2) alignment charts, for Scots Pine, Corsican Pine, European Larch, Japanese Larch, Norway Spruce, Sitka Spruce, Douglas Fir, Western Hemlock, *Abies grandis*, Oak, and Beech.

3547. ARBONNIER, P. Une méthode graphique pour la détermination rapide du volume approché d'un peuplement. **[A graphic method for rapid determination of approximate stand volume.]** *Rev. for. franç.* 10 (12), 1958 (796–806). 3 refs. [F.]

Expounds and comments on J. M. Christie's bulletin on the use of alignment charts for determining stand volume [see preceding abstract].

3548. KUAN, C.-J., *et al.* **[A preliminary attempt at constructing volume tables for [mixed] plantations of Larch and Pine species by height classes.]** *For. Sci., Peking* 1958 (3), (331–54). 19 refs. [Chin.chin.russ.]

Sample trees of *Larix leptolepis*, *L. olgensis*, *L.l.* var. *koreana*, *Pinus tabulaeformis* and *P. koraiensis*, 20–30 years old and up to 24 m. high (511 in all), were felled and their volumes calculated from 2-m. sections by Huber's formula (details are tabulated). Relations between volume (V), diameter (D) and height (H) were found to satisfy the formula $V = aD^bH^c$, where a, b, and c are constants. On the basis of the Soviet height-class curve of N. V. Tret'jakov, and from the sampling data, height classes were constructed after corrections for errors. From the data empirical formulae were derived: for the Larch spp., values of a, b and c are respectively 0·0000762, 2·02177 and 0·71458; for *P. tabulaeformis*, 0·000129, 1·81673 and 0·68548; for *P. koraiensis*, 0·000117, 2·12667 and 0·4311. Accuracy of the volume tables was checked statistically, showing the S.D.'s to be insignificant, the largest (± 4·72%) being that for *P. tabulaeformis*, and the least that for *P. koraiensis* (± 2·02%). At present, plantations of the above species in N.E. China are young or middle-aged. Volume tables must later be completed for older stands.

3549. CH'I, H. H. **[Compiling a volume table by the volume-line method for Fukien Horsetail Pine [*Pinus massoniana*].]** *For. Sci., Peking* 1956 (1), (22–32). [Chin.]

The table, the method of making which is detailed, was based on 344 trees from 11 to 93 years old, listed in three 20-year age groups by 2-cm. d.b.h. and 2-m. height classes, with mean volume of each class. Suitable equations of the form $V(\text{ol.}) = ad^2H$, and values for the constant a are worked out for each age-class.

3550. CLARK, F. B., and WILLIAMS, R. D. **Cubic foot volume tables for planted Shortleaf Pine.** *Sta. Note Cent. St. For. Exp. Sta.* No. 121, 1958. pp. 2.

Data obtained from 180 trees cut in experimental thinnings of 17- and 21-year plantations are used to construct tables showing total and merchantable volume for trees ≥ 10 in. d.b.h., u.b.

3551. KALIPSIZ, A. Doğu kayını hacim tablosu. [**Volume table for stemwood of *Fagus orientalis***.] *Istanbul Üniv. Orm. Fak. Derg.* 8 (1), 1958 (69–91). 18 refs. [Turk.g.*g*.]

The tables, based on sectional measurements of 3556 stems, include bark and stumpwood, and volumes for branches > 7 cm. in diam. as a % of stem volume. Computed volumes for stem and branch wood > 7 cm. are slightly below corresponding volumes for *F. sylvatica* according to Grundner's volume tables and Henriksen's computations [cf. *F.A.* 18 No. 4394]. The % of sawn timber and other industrial wood averages 46%, and decreases with increasing size because of heart rot.

3552. PATRONE, G. Saggio di una tavola dendrometrica del cerro di Monte Fogliano cresciuto in fustaia coetanea. [**An experimental volume table for *Quercus cerris* grown in even-aged stands on Monte Fogliano.**] *Ital. for. mont.* 13 (5), 1958 (223–4). [It.it.f.]

Discusses the construction of a single-entry table based on 5-cm. d.b.h. classes.

3553. DEETLEFS, P. P. DU T. **A timber volume table and alinement chart for *Acacia mollissima* Willd. in Southern Rhodesia.** *J. S. Afr. For. Ass.* No. 31, 1958 (74–80). 6 refs. [E.e.afrik.]

A study based on 609 sample trees selected from trees aged 2–11 years in stands of varying densities. In addition, the relationship of bark weight and timber volume was investigated for 120 trees and found to be closely correlated with height but independent of d.b.h. Timber volume can be estimated when bark yield and mean height of stand are known. [Cf. *F.A.* 10 No. 1704; 19 No. 3265.]

3554. [**Volumes and form factors of Mierenhout [*Triplaris surinamensis*].**] *Jversl. Landsbosbeh., Paramaribo* 1957 (13 + 6 tbls.). [Du.]

Tabulated figures are given, based on measurements of 50 trees in each diameter class, showing volumes per tree and per ha. and form factors for the diameter classes 8–12, 12–16, 16–20 and 20–24 cm., of Mierenhout in the Coesewijne and Uitkijk districts.

3555. [**Volume tables for *Virola surinamensis***.] *Jversl. Landsbosbeh., Paramaribo* 1957 (48–9). [Du.]

Presents tabulated figures for volumes inside and outside bark, and the bark %, for diameter classes 25 (by 5 cm.) to 80 cm., for the Tibiti and Pericage districts.

3556. KRÄUTER, G. Zu einigen Fragen der Holzvorratsermittlung im Zuge der Forsteinrichtung. [**Some queries in growing-stock determination for management.**] *Forst u. Jagd* 8 (7), 1958 (297–9). [G.]

Discusses sources and amount of error in the use of the forest height tariffs [see *F.A.* 17 No. 3099], and errors in circular-plot sampling and in calculation.

524.6. General Surveys of Forests and Whole Tracts of Forest. Partial Enumeration Surveys, Timber Cruising

See also Nos. 2991, 3538–41, 3556.

3557. NÄSLUND, M. **Survey of resources of Swedish state forests.** Translation Service, Department of Internal Affairs, Wellington, New Zealand. 1958. pp. 12 + [13]. Transl. from *Forstwiss. Cbl.* 76 (11/12), 1957 (321–33). [See *F.A.* 20 No. 2149.] Limited distribution.

3558. LINDSEY, A. A., and MILES, S. R. **Field efficiencies of sampling methods in forest survey.** *Abstr.* in *Proc. Indiana Acad. Sci.* 67, 1957 (1958), (101). L.S.

A statistical comparison was made of the field efficiency of the Bitterlich [angle-count] method vs. square and circular quadrats of different sizes. Intensive sampling on a 1:36 map of 20 acres was done to determine for each method the number of trees required for sampling stand density and basal area with 15% S.E. The time taken for each sampling method (sec./tree) was determined in the field. The most efficient proved to be one that combined sampling b.a. by the Bitterlich method, and stand density by circular $\frac{1}{10}$-acre plots using a 6-in.-base range-finder from the central point. The operator turns through 360° once with an angle-gauge and again with the range-finder. No measurement or estimate of tree diam. is required, nor are plot boundaries. By this method 1·7 hours are required to obtain stand density and b.a. with a 15% S.E. for Sugar Maple, this species being third by density and fourth by b.a. in the stand. [No further data are given on stand conditions.] The complete Bitterlich method required 3 hours. Circular plots by range-finder and measurement of tree diam. proved more efficient than square plots surveyed by diagonals N.–S. and E.–W. from the central point. The circular $\frac{1}{10}$-acre plots took 2–5 hours to sample, the $\frac{1}{40}$-acre 5·9, the $\frac{1}{10}$-acre squares 5·4, the $\frac{1}{40}$-acre 8·9.

3559. SETH, S. K. **Inventory methods in Teak forests in India.** [*Docum.*] *2nd Sess. FAO Teak Sub-Comm., Bandung 1957* No. *FAO/TSC*-57/17, [1957]. pp. 3. Limited distribution. [Cf. *F.A.* 17 No. 697; 18 No. 3176.]

3560. SINHA, J. N. **Partial enumeration in hill and plains forests.** *Indian For.* 84 (12), 1958 (730–9).

Partial enumerations were carried out in three forest divisions in Bihar in the course of preparing or revising working-plans. The method employed was stratified random sampling, the strata being formed chiefly by aspects of hills and by approximate homogeneity of crop. Sampling units (of which at least two were sampled per stratum) were demarcated by easily identifiable topographical features, and no line cutting was necessary. Some enumeration data are given, together with assessments of the precision of sampling.

3561. PARDÉ, J. Recherches sur l'application aux taillis-sous-futaie des méthodes mathématiques-statistiques d'inventaire. **[The application of statistical methods of enumeration to coppice-with-standards.]** *Ann. Éc. Eaux For. Nancy* 15 (2), 1957 [1958], (455–556 + 2 photos). 33 refs. [F.f.e.g.]

Describes enumerations made in the forest of Izeure near Dijon, which consists of coppice with a relatively dense overwood composed mainly of *Quercus robur* and *Q. sessiliflora* (77%) with some Beech (12%) and other species (11%), and averaging 177 cu.m./ha. The survey of 170 ha. was done by (1) complete enumeration, (2) stratified random sampling, (3) systematic sampling. It is concluded that (3) using 10-are circular plots will give results at least as good as (2). Such sampling of 10% of the area cost only half as much as (1), in the case studied, and is considered adequate for an area > 75 ha. Sampling of 5% cost only one-third as much as (1) and is applicable to areas > 170 ha. These methods gave a standard error of ± 10% for total volumes. The practical details of systematic sampling are explained.

3562. GROSSMANN, M. Untersuchungen über die Art der Probenahme und die zweckmässigsten Probekreisgrössen bei mathematisch-statistichen Holzvorratsinventuren. **[Researches on sampling and on the best size of circular plot in statistically based inventories.]** *Forst u. Jagd* 8 (7), 1958 (299–300). [G.]

The circular-plot method [cf. *F.A.* 18 No. 4409] has fulfilled all expectations since its introduction in 1953, but the rigidity of the grid makes it impossible to get the most accurate total volume figures from the several stocking types. To improve this, the following 20 treatments of 4 concentric circular-plot size combinations and 5 grid lay-outs were statistically investigated on > 300 ha. of forest. Plot combinations: 0·25, 1·0, and 4·0 ares; 0·5 and 3; 0·5, 2, and 8; 10. Grid: 100 × 100 m.; 71 × 71; 50 × 50; 100 × 50—giving respectively one plot per 1, 0·5, 0·25 and 0·5 ha.—and another treatment with both the grid and plot variable. Among the conclusions of this abridged report are the following. Independent of stocking type, the best number of stems/plot is 12–14 (given by the plots up to 4 ares). For least field work and greatest accuracy the combination 0·5- and 3-are plots is best. For wider spacing in older stands, plot number should be increased. The best results for both large and small areas and those of special characteristics were got with a fixed area enumeration % but a varying plot distribution (the grid). This operated in better consonance with stand structure than the present fixed grid. The best grid was the oblong, with the long sides extending from the base line. The saving in time by using the oblong grid and by reduction of concentric plots from 3 to 2 was 5–10 and 10–20% respectively. With the variable grid, a mean of 2 plots/ha. over large areas should be the aim, generally one per *Teilfläche* [site-distinguished unit of a sub-compartment; ca. 0·5 ha.]. Grid density should vary between 1 plot/0·25 and 1 plot/2 ha. Punched cards will reduce the extra computation time involved in using the *Teilfläche* instead of the sub-compartment, and the lay-out of the grid, conformable with the regularity, size and stocking type, can be read from a simple stratification key. Among further details on the best method of stratification and the factors on which accuracy depends is the claim that the researches are a good empirical illustration of applicability of statistical laws to *systematic* sampling.

3563. RASMUSSEN, E. T. Repræsentive målinger ved grundfladebestemmelse. **[Representative measurements in determining basal area.]** *Dansk Skovforen. Tidsskr.* 43 (12), 1958 (607–17). [Dan.]

Preliminary studies were made on results from measurements of (1) every *n*th single or double row or (2) circular sample plots, in a forest district of Lolland in 1956; the results may not be entirely applicable elsewhere. With (1) the measurements were in 3 Spruce plantations, mean diam. 12, 16 and 20 cm., at sampling intensities of 1/5 to 1/50, either as single or as double rows. Double rows gave less scatter of results than single rows, and, at least in the stand of 20 cm. mean diam., slightly more accurate results. As double-row sampling is also less time-consuming, it is considered preferable, and intensities as low as 2/50 gave adequate results. With (2), the measurements were made in 5 Beech stands of mean diam. 16·2, 22·8, 29·2, 34·7 and 46·5 cm. Sample plots, arranged concentrically, had diameters of 8, 11·3, 16·0, 25·2 and 35·2 m., and areas of 0·005, 0·01, 0·02, 0·05, and 0·10 ha. respectively. The results show that the two smallest sample-plot areas should not be used for [mean?] diam. > 25 cm. Better results for a given sampling intensity were obtained by increasing the number and reducing the size of sample plots. The number of plots recommended for stand diam. < 15, 15–25 and 25–35 cm. is 2 per ha. with areas of 0·02, 0·05, and 0·10 ha. respectively, and, in row sampling, intensities of 1/25 or 2/50, 1/10 or 2/20 and 1/5 or 2/10 respectively.

525. Volume by Assortments. Merchantable Volume

See also Nos. 3225, 3597.

3564. DAWKINS, H. C. **Sapwood thickness and volume of some indigenous trees.** *Tech. Note For. Dep. Uganda* No. 7 (58), 1958. pp. 1.

The mean sapwood plus bark %s of the o.b. volume, based on 20 trees each (5–10 ft. girth) of the genera *Lovoa*, *Entandrophragma*, *Albizzia* and of *Morus lactea* were 35, 32, 40 and 37 respectively. Both *Piptadeniastrum* and *Fagara* had means 10–20% higher. No correlation was found between girth and sapwood radius.

526. Log Measurement. Scaling

3565. TENDLER, M. M. Avtomatizacija učeta kruglogo lesa. **[Automatic volume indicators for logs.]** *Lesn. Prom.* 1958 (12), (26–7). [Russ.]

A device made by A. A. Gračev feeds to an indicator the changes in electrical tension from the varying amount of resistance determined by the diameter of the log being measured. The number and total lengths of logs can also be measured and recorded. [Cf. *F.A.* 19 No. 4871.]

527. Solid Volume of Stacked Products (including Converting Factors)

See No. 3229.

53. Special Measurements of Trees and Stands (Crown Dimensions, Stand Density etc.)

See No. 3516.

3566. DOMNICK, H. Zum gegenwärtigen Stand in der Kronenprojektion. [**The present position in measuring crown projection.**] *Forst u. Jagd* 8 (7), 1958 (300–2). [G.]

Classifies 10 instruments according to principle of construction (angle, prism, mirror etc.) and use (direct measurement of crown radii, perpendicular-finders with and without ground marking, and range-finder), outlines their construction and describes the Markör-Projektiv invented by the author for rapid and accurate work (10 crowns/hour), obtainable from the firm Bloeck, Oranienburg-Eden. It consists of a horizontal sighting device, a coloured powder container, 5 tubes which can be assembled, a balancing weight, a spirit level, a compass, a self-adjusting upright tube with cross-hairs, and a reversible double mirror (plane and convex) or two different convex mirrors, for 2-scale reduction of image. Standing under the crown periphery the operator adjusts his position for the perpendicular by the mirror in the self-adjusting tube, and brings the two sets of cross-hairs and the crown edge into coincidence. The crown projection radius is taken from the angle to the tree base (2–5% error in 10 m.), or the ground can be marked by releasing coloured chalk at each determination so as to delimit crown projection.

54. Assessment of Site Quality

See also Nos. 3614, 3616, 4009.

3567. PARDÉ, J. Une notion nouvelle et fructueuse: l'indice C.V.P. [**A new and fruitful concept: the CVP index.**] *Rev. for. franç.* 10 (3), 1958 (195–201). 2 refs. [F.]

Discusses Paterson's index (with Weck's emendations) [cf. *F.A.* 19 No. 2134]. The CVP index is

$$I = \frac{Tv}{Ta} \times P \times \frac{G}{12} \times \frac{E}{100}$$

where Tv = mean monthly temperature in ° C. of the hottest month, Ta = difference in ° C. between mean monthly temperatures of the hottest and coldest month, P = mean annual precipitation in mm., G = length of growing season in months, and E is Milankovitch's factor

$$\frac{100\ Rp}{Rs}$$

where Rp = radiation at the pole in 10^3 g. cal./sq. cm./min. and Rs the radiation at the site in question). The index varies from zero in polar and desert regions to $\geqslant$ 20,000 in equatorial regions. Paterson calculated his CVP index for some hundreds of sites all over the world, and wherever possible gave corresponding 'ideal site class'. Forest growth is impossible where CVP is < 25; for CVP of 25 to 30,000 potential forest production follows the same trends as the index. For CVP $>$ 30,000 (an uncommon occurrence) forest productivity tends to fall.

3568. PARDÉ, J. Retour sur l'indice C. V. P. de Paterson. [**More about Paterson's CVP index.**] *Rev. for. franç.* 11 (1), 1959 (50–3 + 1 map). [F.]

Applies the index [see preceding abstract] to France, and on this basis deduces the existence of 4 main regions: (1) oceanic (a narrow littoral strip of no forestry interest), (2) Mediterranean, (3) high-montane, and (4) cold-temperate. The *I* values of (4) are such as to make it clearly the most suitable for productive forest.

3569. CHAO, C. [**Site index determination and methods of procedure.**] *For. Sci., Peking* 1958 (2), (189–95). 6 refs. [Chin.russ.]

Stresses the need for site indices to cover a range of forest sites in China and criticizes recent attempts in the Laoling region. A method of using height growth to draw up site index curves is described.

3570. GING[CHING], H.-M., and WANG, D. T. [T.-C.] [**The construction of a site-class table by least square techniques.**] *For. Sci., Peking* 1958 (2), (197–214). 10 refs. [Chin.chin.e.]

Describes the construction of a site-class [mean height/age] table for *Cunninghamia lanceolata* based on 132 plots in vegetatively propagated stands in Fukien province, aged 5–50 years, by computing the height-growth curve, for a mean site, and relative shifts up or down, for better or poorer sites.

3571. GRIFFITH, A. L. **The stock mapping to quality classes of an even aged forest.** *E.A.A.F.R.O. For. tech. Note E. Afr. agric. For. Res. Organ.* No. 10, 1958. pp. 4.

Height/age curves are now available by 3 quality classes (Q) for *Cupressus lusitanica* in Kenya. For 20-year crops the dividing points for QI/II and QII/III are 78 and 56 ft. respectively and the method of mapping these, by taking top heights near grid intersections and along grid lines is described, with a diagram.

3572. DOOLITTLE, W. T. **Site index comparisons for several forest species in the Southern Appalachians.** *Proc. Soil Sci. Soc. Amer.* 22 (5), 1958 (455–8). 14 refs. O.R.E.

[Cf. *F.A.* 19 No. 793.] Using measurements of total height and ages of dominant and co-dominant specimens of *Pinus strobus*, *P. virginiana*, *P. echinata*, *P. rigida*, *Quercus coccinea*, *Q. velutina*, *Q. rubra*, *Q. prinus*, *Q. alba*, and *Liriodendron tulipifera*, site indexes of the 10 species were determined and correlated by regression methods, so that when the site index was known for one species for a given piece of land, it was possible to determine the site index for any or all of the other 9 species there. A graph comparing the site indexes of the 10 species is presented, and tests of the accuracy of site-index prediction discussed. Of all species, *L. tulipifera* has the highest site index on the best sites, and the lowest on the poorest sites.

3573. CHOATE, G. A. **Site index charts for Douglas Fir in the Pacific Northwest.** *Res. Note Pacif. Nthwest. For. Range Exp. Sta.* No. 161, 1958. pp. 6. 2 refs.

The charts can be used to estimate site index from the stand age and the mean height of dominant and co-dominant trees, and are based on yield-table data [cf. *F.A.* 12 No. 823].

3574. BISHOP, D. M., JOHNSON, F. A., and STAEBLER, G. R. **Site curves for Red Alder.** *Res. Note Pacif. Nthwest. For. Range Exp. Sta.* No. 162, 1958. pp. 7. 2 refs.

This preliminary report presents site-class curves (60 to 120 ft. by 20-ft. classes) for *Alnus rubra*, developed during yield-table construction and based on stem analyses of 43 trees from a representative spread of site conditions in W. Washington.

3575. COOLEY, J. H. **Site index curves for Paper Birch in Northern Wisconsin.** *Tech. Note Lake St. For. Exp. Sta.* No. 541, 1958. pp. 2.

Based on measurements from 108 plots in N. Wisconsin and the Michigan Upper Peninsula. The site index at 50 years ranged from 34 to 77 ft.

56. Increment. Development and Structure of Stands

See also Nos. 2880, 2882, 2901, 2946, 2961, 3003–4, 3023 *et seq.*, 3154–5, 3158, 3166 *et seq.*, 3191, 3207.

3576. EMROVIĆ, B. Funkcionalni papir za volumni prirast. **[Special logarithmic paper for volume increment/d.b.h. relationships.]** *Šum. List* 82 (11/12), 1958 (398–406). 5 refs. [Croat.e.]

3577. LI, K.-C. **[Preliminary study of volume increment % in natural forests at Dailen in the Little Hingan Mts. [N.E. China].]** *For. Sci., Peking* 1958 (2), (172–88). [Chin.russ.*russ.*]

Tabulates data on the diameter and volume m.a.i. for hardwoods and conifers grouped, and for 9 individual species, based on increment cores taken at b.h. from 4670 conifers and 1503 hardwoods. Species were: *Pinus koraiensis*, Spruce [*Picea jezoensis*?], Fir [*Abies nephrolepis*?], *Tilia* spp. (*T. mandshurica* and *T. amurensis* together), *Ulmus* spp. (*U. laciniata* and *U. propinqua* together), *Betula* spp. (*B. platyphylla* and *B. costata* together), *Fraxinus mandshurica*, *Populus* spp. (*P. ussuriensis* and *P. davidiana*), and *Acer mono*.

3578. FRANZ, F., and KOPP, D. Wachstumgang und Ertragleistung der Kiefer. Untersuchungen auf einigen wirtschaftlich wichtigen Standortseinheiten des nordostdeutschen Tieflandes. **[Researches on the course of growth and the yield of Pine in some economically important sites of the N.E. German plain.]** *Forst u. Jagd* 8 (6), 1958 (276–80). 3 refs. [G.]

A short summary of results to date of a study to be published under the title *Ertragskundliche Untersuchungen auf standortlicher Grundlage unter Benutzung des Zahlenmaterials langfristiger forstlicher Versuchsflächen.* Here are detailed the method and scale of sampling for comparability and the method of selection for the comparison separately of climatic and site effects; also comparison of stem number, mean diameter, dominant and mean height, and b.a. and volume increment with values in Wiedemann's 1943–48 table. The sampling covers 6 areas in 3 forest regions.

3579. PARDÉ, J. La productivité des forêts de pin d'Alep en France. **[The yield of *Pinus halepensis* forests in France.]** *Ann. Éc. Eaux For. Nancy* 15 (2), 1957 [1958], (365–414 + 5 photos, 1 tbl., 1 map). 30 refs. [F.f.it.span.]

Summarizes the results of experiments carried out over a period of 25 years in the forest of Gémenos near Marseilles. The chief findings are: (1) Bark volume is 23–24% of sawtimber volume. (2) Schaeffer tariffs are applicable to *P. halepensis* stands. (3) Heavy thinnings (to 190 stems/ha. at 70 years) are necessary to obtain the desired dimensions (110–120 cm. g.b.h.) at that age. (4) The stands studied reached a mean height of 17–18 m. at 70–80 years, and by then had produced 3 cu.m. sawtimber/ha./year from establishment.

3580. YAWNEY, H. W., and TRIMBLE, G. R., JR. **West Virginia's unusual Pine plantation.** *J. For.* 56 (11), 1958 (849–51).

Describes a 25-year-old plantation of *Pinus strobus* in which the trees are 65–70 ft. tall and have not been damaged by blister rust or White Pine weevils. Site, stand and volume data are discussed, and it is concluded that the plantation is growing under nearly optimum conditions.

3581. MUTIBARIĆ, J. Neki podaci o prirastu mlade sastojine *Populus robusta*, *P. marilandica* i *P. serotina.* **[Some data on the increment of young stands of *P.* × *robusta*, *P.* × *marilandica* and *P.* × *serotina*.]** *Topola, Beograd* No. 5, 1958 (384–95). 3 refs. [Serb.]

Measurements of 221 trees showed that the mean diam. increment of *P.* × *robusta* and *P.* × *marilandica* between 4 and 5 years was 2·4 cm., that of *P.* × *serotina* 1·7 cm. *P.* × *robusta* showed the best height growth at 5 years, max. 12·55 m. compared with 11·20 m. for *P.* × *marilandica* and 9·85 m. for *P.* × *serotina.*

3582. RADULOVIĆ, S. O bahofenovoj topoli na Deliblatskom pesku i rezultatima dosadašnjih proučavanja. **[*Populus bachofeni* on the Deliblato sands: results of recent studies.]** *Topola, Beograd* No. 8, 1958 (673–9). 6 refs. [Serb.f.]

Measurements in a 32-year stand on 2 sample plots of (*a*) 51 stems, (*b*) 145 stems, showed that the mean height increment on (*a*) was 60·5 cm., on (*b*) 50·7 cm., and diam. m.a.i. 6·1 mm. on (*a*), 5·6 mm. on (*b*). Stem form and habit are described. The author concludes that it is a useful species for planting in depressions in this region. [Cf. *F.A.* 14 No.1999.]

3583. COZZO, D. Informaciones sobre el crecimiento de bosques de eucaliptos en diferentes sitios de la Argentina. **[The growth of Eucalypt stands on different sites in Argentina.]** *Rev. for. argent.* 2 (4), 1958 (131–7). 12 refs. [Span.]

Summarizes data published in Argentina from 1948 onwards by different authors on the following species, growing under various conditions in different parts of Argentina: *Eucalyptus rostrata*, *E. citriodora*, *E. maideni*, *E. robusta*, *E. saligna*, *E. sideroxylon* and *E. viminalis.* The data given include number of trees/ha., mean diam. and height,

volume/ha. and m.a.i. Some information is also presented on growth of coppice regeneration in clear-felled areas.

3584. PUDDEN, H. H. C. **Note on *Vitex keniensis* in plantation.** *Tech. Note For. Dep. Kenya* No. 54, 1957. pp. 1.

Gives, at intervals of 3–4 years up to 30 years, stems/acre, mean diameter and height, and increments (m.a.i. and c.a.i.) for diameter and height. Initial density was 1210 and height and diameter at 30 years were 73·1 ft. and 13·3 in. respectively. More frequent thinnings are recommended, for which a schedule is given.

561. Increment in Height, Diameter, Basal Area, Form and Quality. Variations and Trends; Dendrochronology

See also Nos. 2991, 3448, 3456.

3585. SUNDVOR, T. „Noen undersøkelser over når tykkelsestilveksten innstilles hos lauvtrærne om høsten på Vestlandet. **[Studies on the date in autumn when diameter increment of deciduous trees in Vestland ceases.]** *Blyttia, Oslo* 14, 1956 (122–5). [Nor.e.] L.S.

Twig samples from 1 or 2 trees of each species studied were taken at weekly intervals from 7 July to 30 Sept. 1941 and examined for cambial activity. This stopped on or about the following dates: *Betula pubescens*, early August and 29 Aug., on deep and poor sandy soil respectively; *Prunus padus* 22–29 Aug.; *Alnus incana* 20 and 29 Aug. for a younger and older tree respectively; *Corylus avellana* soon after 5 Sept.; *Fraxinus excelsior* for one tree 19–30 Sept. and for the other, stripped of foliage on 3 Sept., 5–12 Sept.

3586. **A Swedish microdendrometer.** *For. Equipm. Note, FAO* No. *A*.13.58, 1958. pp. 1.

Briefly describes an instrument manufactured by Nils Arnberg, Bromma, Sweden, which can register growth up to 10 mm. For trees with thick bark, it is necessary to plane the surface and take off part of the bark. When used in tropical countries for quick-growing species, the scale of the instrument should be extended to at least 15–20 mm.

3587. HEATH, J. P. **Increment core technique and preventing core shrinkage.** *J. For.* 56 (12), 1958 (909–10). 13 refs.

The technique involves using strips of hardwood grooved so as just to take a core. The cores are glued in the grooves with a polyvinyl glue, and core data noted on the hardwood strip.

3588. LENZ, O. **The use of radiography in the examination of annual rings.** Translation Service, Department of Internal Affairs, Wellington, New Zealand. 1958. pp. 6 + [13]. Transl. from *Mitt. schweiz. Anst. forstl. Versuchsw.* 33 (5), 1957 (125–34). [See *F.A.* 19 No. 4644.] Limited distribution.

3589. ROGERS, M. T. **Ring-shadows.** *Silva fenn.* 93 (3), 1957 (1958). pp. 8. 7 refs. [E.fi.]

Describes a simple method of obtaining an exact representation of the growth-ring configuration from a tree stump, by placing a piece of paper over it and rubbing with a soft pencil. The denser late-wood appears as darker bands compared with the early wood, giving readable results until an advanced stage of decay. The only equipment required is a knife for clearing stump débris and a pencil and paper: cheap writing paper gives satisfactory results and soft pencils are better than hard. Compression wood also shows on the rubbings.

3590. SCHOVE, D. J., and LOWTHER, A. W. G. **Tree-rings and medieval archaeology.** *Repr.* from *Medieval Archaeology, London* 1, 1957 (78–95). 44 refs.

Discusses the correlating of chronology from growth rings with known dates, e.g. by tentative dating from associated finds (e.g. of coins), and by references in the chronicles to droughts, acorn-years, etc. A graph tentatively dated A.D. 714–835 and an exact analysis of precisely dated 13th-century material, both for England, are presented. The selection of timber for dating, methods, and future research are discussed.

3591. RUDAKOV, V. E. O metode izučenija vlijanija kolebanij klimata na širinu godičnyh kolec dereva. **[A method of studying the influence of climatic fluctuations on annual ring width.]** *Bot. Ž.* 43 (12) 1958 (1708–12). 19 refs. [Russ.]

The author uses a 'modular coefficient',

$$M = \frac{a}{b} \times 100,$$

where a is the measured ring width and b is ring width calculated as the sliding mean for a fairly short period of years, to eliminate, so far as possible, effects of age etc. (in the curves illustrating the use of this method, the period selected for b is 21 years).

3592. WEIHE, J. Die Schwankungen des Durchmesserzuwachses in badischen Fichtenbeständen in der Zeit von 1945 bis 1954. **[Fluctuations in diameter growth in Spruce stands in Baden, 1945–54.]** *Allg. Forst- u. Jagdztg.* 129 (11/12), 1958 (233–41). 8 refs. [G.g.e.]

Analyses variations round the 10-year (1945–54) mean, based on the mean of 25 trees from each of 300 stands [cf. *F.A.* 19 No. 2147], so as to elucidate the influence of site, stand, and climatic factors on the effect of the 1947 and 1949 drought years and the rate of recovery. Mean annual temperatures and age had little influence. Least effect and best recovery (comparing the first and second 5-year periods) were found where mean rainfall during the growing season was highest. The drainage and water capacity of the soil are of considerable influence: best conditions are found in loamy sand to sandy loam, while either sand or loam are unfavourable; 'two storeyed' soils (silt over loam or over compacted sandy loam) are intermediate. The variation coefficient increases from very good to medium site classes, but then decreases towards the poor sites.

3593. WEIHE, J. Zum Zusammenhang von Höhen- und Durchmesserzuwachs der Fichte und zu ihrer Abhängigkeit von Niederschlag und Wärme. **[Correlations between height and diameter growth of**

Spruce and their dependence on precipitation and temperature.] *Allg. Forst- u. Jagdztg.* 130 (1), 1959 (11–6). 13 refs. [G.g.e.]

Analyses height and diameter growth of 6 stems, and diameter growth of a further 10 stems from each of 4 stands, all from the Freiburg region. Height and diameter growth frequently showed simultaneous low, but rarely simultaneous high values, and no correlation of diameter and height growth (of the same or the next year) was found. Correlation coefficients worked out for monthly and annual temperature and precipitation data were low and difficult to interpret. In general it appeared that diameter growth was most stimulated by rainfall in May and June, and inhibited by high temperatures in July and August, while height growth was stimulated chiefly by high rainfall and low temperatures in September of the year of bud formation, and by high rainfall during the following May.

3594. FRITTS, H. C. **An analysis of radial growth of Beech in a Central Ohio forest during 1954–1955.** *Ecology* 39 (4), 1958 (705–20). 24 refs.

Fritts dendrographs [cf. *F.A.* 17 No. 3124] were mounted on 6 dominant *Fagus grandifolia* trees in a Beech/Maple and swamp forest tract before the beginning of the 1954 growing season and daily measurements of tree radii were recorded for 1954–55, along with measurements of temperature, rainfall and soil moisture. Data on % sunshine, rainfall, evaporation, relative humidity and average wind velocity from a neighbouring meteorological station were also used. A multiple regression analysis of tree growth and 14 variables was made, covering 112 days of each growing season. More than half the growth-rate changes due to environmental changes can be attributed to changes in maximum temperature and soil moisture; but % r.h., sunshine of the previous day, precipitation and % sunshine of the measurement day are also important contributors to radial growth, though less influential. Increment is greatest during cloudy or rainy days that are immediately preceded by a period of sunny weather. The lowest increment occurs immediately after stormy periods. If soil moisture is not limiting, growth will gradually increase with clearing weather. Shrinkage occurs during prolonged rainless periods late in the growing season, when soil moisture is low and transpiration high. [Cf. *F.A.* 15 No. 1168.] *From author's summary.*

562. Volume Increment

3595. KLEINERT, R., and HENGST, E. Massen- und Wertzuwachs, dargestellt an Versuchsergebnissen von Eiche, Roteiche und Douglasie. [**Volume and value increment as shown by trial plots of Oak, Red Oak and Douglas Fir.**] *Repr.* from *Wissenschaftliche Zeitschrift der Technischen Hochschule Dresden* 6 (2), 1956/1957 (301–10). [G.]

Includes data from one of the few remaining thinning series in Oak dating from before 1914 (in a 100-year-old stand in N.W. Saxony), from a local yield table for Douglas Fir in Saxony and Thuringia, and from *Quercus borealis* trial plots in Saxony, including promising multi-storeyed pure or mixed stands.

3596. WRIGHT, K. H., and LAUTERBACH, P. G. **A 10-year study of mortality in a Douglas-Fir sawtimber stand in Coos and Douglas Counties, Oregon.** *Res. Pap. Pacif. Nthwest. For. Range Exp. Sta.* No. 27, 1958. pp. 29 + 1 photo. 6 refs.

Observation of 959 ¼-acre plots in the Millicoma forest in 1945–55 showed that mortality in the 180-year Douglas Fir stands varied from 4990 bd. ft./acre in 1951 to 60 in 1955, and over the 10 years, mortality (in bd. ft.) was > 5 times the increment, affecting chiefly the co-dominants. Insects, particularly *Dendroctonus pseudotsugae*, accounted for 59% of the dead trees, windthrow and wind breakage for 38%. Disease, particularly root-rot, was also an important factor. The salvage of killed trees is urged, to expedite which, recently developed survey methods, e.g. aerial survey, should be used, logging should be planned to give maximum recovery of dead material, more access roads should be built, and small-scale equipment introduced to handle the salvage. When mortality reaches catastrophic proportions, exploitation should be intensified. Other studies of mortality and growth in the Douglas Fir region are discussed briefly.

566. Yield Tables and Their Construction

3597. LOGUTOV, D. P. Hod rosta el'nikov Karpat. [**The growth of Spruce stands in the Carpathians.**] *Lesn. Hoz.* 11 (5), 1958 (19–21). [Russ.]

Presents a yield table based on data from 85 sample plots (plus data from others established in earlier years) in Spruce plantations and natural Spruce/Silver Fir stands, for site classes Ia–II and ages up to 100 or 120, including figures for the assortments represented.

3598. KRAUTER, O. W., and BAKER, V. W. **Calculated yields from young-growth Ponderosa Pine management.** *Tech. Publ. U.S. Soil Conserv. Serv.* No. 132, 1957. pp. 14. 10 refs.

This publication presents a method for calculating future yields from management of young second-growth Ponderosa Pine. Certain assumptions have necessarily been made, based on the best technical information available. These serve as a basis for calculated step-by-step procedures for thinning young stands, using basal area as the control factor. These procedures determine, for a given rate of growth, the spacing requirements of trees in the stand to obtain maximum usable production. Potential yield tables have been calculated, assuming different levels of increased growth. This information will help to guide foresters and woodland owners in establishing management programmes. Economic guides based on these yield tables have been developed in a separate publication. *Authors' summary.*

3599. FEKETE, Z. A kísérleti akácosok újrafelvételével kapcsolatos kérdések. [**Problems connected with re-enumerations on sample plots of *Robinia pseudoacacia*.**] *Erdészettud. Közl., Sopron* 1958 (1), (65–74). 11 refs. [Hu.hu.russ.f.g.*russ.f.g.*]

Enumerations after a 5- to 6-year interval showed greater increments than expected according to the

author's Robinia yield-table of 1937, presumably owing to heavier thinning, and the tables therefore need revision. Joint tables for coppice and high-forest stands are suggested, as volumes for both types at the same mean heights were found to be very close. *From author's summary.*

568. Other Mensurational Studies of Stand Constitution and Changes Therein. Distribution of Growth by Tree Classes etc.

3600. WECK, J. Vom Umsetzen unserer Waldbäume. **[Changes in relative diameter-class ranking of individual trees in stands.]** *Allg. Forstzeitschr.* 13 (49), 1958 (717–20). 4 refs. [G.]

The author first re-examines research done by J. Busse in Tharandt (published in *Tharandter Forstliches Jahrbuch* 81 for 1930) on shifts in diameter ranking on trial plots of Oak, Beech, Spruce and Pine aged 65–117 years, and presents a table, on the basis of Busse's figures, showing the number of trees that had moved out of or into the class of the 100 largest-diameter stems over a period of 20 years. The number of trees moving downwards from that class varied from 13 in a 68-year Spruce stand established by regular planting, to 38 in a similar stand established by direct sowing in rows, and the number of trees moving up by more than one 100-tree class showed a similar tendency. No effect from thinning could be observed. The author examined increment cores taken from 40–100 trees, considered representative, from 21 stands, chiefly even-aged Spruce and/or Pine with or without Beech, Silver Fir, etc. in N.W. Germany and E. Germany, plus two stands in the Harz mountains and one on the Bavarian slope of the Alps, tracing increment back as far as 80 years, and arranging the individual trees in order of diameter at the end of successive 20-year periods, the correlation of these series being a measure of the degree of change in relative position. In addition, the % of trees that had moved up or down by 1, 2, or 3 out of 5 diameter classes each containing an equal number of trees is shown. The degree of change varied considerably. As expected, it was greater in mixed than in pure stands. Except for the 3 mountain districts, it tended to decrease with age and it was presumably greater in the period of culminating increment and appeared to be more marked on good than on poor sites. It could probably be influenced by thinning as regards its intensity, but not its direction. The need for research into criteria for recognizing hereditary growth-rhythms as a guide to thinning practice is stressed [cf. *F.A.* 19 Nos. 2869, 4638].

3601. KALIPSIZ, A. Doğu kayınında artım ve büyüme araştırmaları. **[Yield studies on *Fagus orientalis*.]** *Istanbul Üniv. Orm. Fak. Derg.* 7*A* (2), 1957 (97–143). 75 refs. [Turk.g.]

A detailed statistical investigation of the structure of virgin stands up to 300 years, based on 29 uneven- and 6 even-aged plots (23·85 ha.) in 8 localities along the Black Sea and the Sea of Marmora. For each plot a stand table shows for diameter classes of (*a*) 10–20, (*b*) 22–34, (*c*) 36–50, (*d*) 52–72 and ⩾ 72 cm., the stem number, b.a., stem volume (from a table based on 3556 trees) and c.a.i. Increment and growth of single trees (stem analyses) and of stands are presented, and the latter correlated with site factors, stand structure (diameter distribution, age, stratification, tree class, growing-stock volume). On the basis of these plots and 80 other enumerations, the ideal (*Plenterwald*) structure is stated to be 175–300 stems and 300–450 cu.m./ha. with 40–20% by volume of diam. class (*b*) and 25–45% (*c*) plus (*d*), provided that there is an increment % > 1 and annual increment > 3 cu.m./ha. The best sites for this Beech lie N. of 40° 30′ at 1000–1250 m. alt. on N. and N.E. aspects, on well drained steep slopes with loamy soils up to 50 km. from the sea, in Thornwaite climatic types AB′r, B_{2-4}Cr and BB′s.

3602. PEJOVIĆ, D. Prilog poznavanju strukture i prirasta u čistoj bukovoj sastojini karaktera prašume u predelu 'Ćosin Grob' (Grdelička Klisura). **[Structure and increment of a pure Beech stand of quasi-virgin type in the Ćosin Grob region, Grdelička Klisura.]** *Šumarstvo* 11 (3/4), 1958 (173–85). 10 refs. [Serb.serb.e.f.]

Presents and discusses mensurational data on total number of stems and their distribution by diam., b.a. and volume class, and increment determined from increment cores, on 34·85 ha. of *Fagetum montanum serbicum*, in S.E. Serbia. No exploitation appears to have been done on this site.

58. Surveying and Mapping. Aerial Surveys

See also No. 3265.

3603. MEYER, M. P., and TRANTOW, L. H. **Some observed effects of variations in photo paper emulsion and tone upon stereo perception of tree crowns.** *Photogramm. Engng.* 23 (5), 1957 (896–9). 2 refs. L.S.

[Cf. *F.A.* 18 No. 4463.] Eight stereo-pairs of aerial photos, each representing a different emulsion tone combination, were printed from the same 1 : 15,840 scale full panchromatic negatives of a forested area in northern Minnesota. As a result of tree-crown counts made by 3 trained forest-photo interpreters, the following results were obtained: conventional cold (blue-black) tone prints produced significantly better results than were obtained with warm (brown) tone prints; and some of the 4 different dull-surface papers tested produced significantly better results than others. *From authors' summary.*

3604. NELSON, R. E. **Soil-vegetation survey of a Central Sierra snow zone watershed.** *Misc. Pap. Calif. For. Range Exp. Sta.* No. 21, 1957. pp. 43.

Soils and vegetation of the Snow Laboratory Basin, covering ca. 2500 acres in the Sierra Nevada, were classified and mapped by aerial photography in 1956. A map is presented showing commercial timber stands by age, broad diam. classes and density classes, broad vegetation types, and density of woody vegetation; another shows soil types, species composition of the vegetation, and site quality of the commercial forest land.

3605. ZEHNDER, H. Waldbauliche Auswertung von Luftaufnahmen aus den Jahren 1944–1951–1957 des Lehrwaldes Albisriederberg. **[Silvicultural evaluation of aerial photographs of the Albisriederberg**

instruction forest (near Zurich) taken in 1944, 1951 and 1957.] *Schweiz. Z. Forstw.* 109 (11), 1958 (648–62 + 5 photos, 5 maps). 12 refs. [G.f.]

A study was made of aerial photos, none of which was taken for forestry purposes (only two stereoscopic), to assess the value of aerial photography under Swiss conditions (characterized by a prevalence of the irregular shelterwood system, great local variability of site, climate, and treatment, numerous species etc.). The possibility of distinguishing between species varied with season but was largely limited to conifers vs. hardwoods. The progress of conversions, by systems and major composition (conifer/hardwood), and the progress of final fellings etc. could be followed better than on the existing series of maps, and the general state of a stand could be judged from density, crown form etc., but whether it was actively being regenerated, or needed thinning or tending, could not be seen. It is recommended that aerial photographs, specially taken for forestry purposes and preferably on a scale of 1 : 8000, be used as a basis for future working-plan revisions, supplemented by transparent overlays for details of compartments and other data.

3606. SWANTJE, H. **Photogrammetric methods in reforestation surveys.** *Photogramm. Engng.* 23 (4), 1957 (789–90). L.S.

Advocates the combined use of aerial photographs and ground sampling, instead of the systematic strip sampling at 10-chain intervals at present required by the British Columbia Forest Service for regeneration surveys. Costs are estimated as ca. 42 cents/acre, roughly ⅔ the cost of ground survey.

3607. SPIERS, J. K. **The use of topographic maps based on aerial photographs in logging planning.** *N.Z. J. For.* 7 (5), 1958 (107–15).

Gives some account of the construction, use, and limitations of such maps in Kaingaroa Forest.

3608. MASSIE, E. S. **Forest Service photogrammetric aids in expediting road location and design.** *Photogramm. Engng.* 23 (5), 1957 (923–6). L.S.

Describes the methods used by the U.S. Forest Service in planning forest roads. These include (1) preliminary reconnaissance using a topographic map (scale ca. 1 : 24,000) based on aerial photos; (2) verified reconnaissance on medium-scale aerial photos after the most apparently feasible route has been selected by (1); and (3) strip mapping based on 1 : 10,000 scale photos taken on flight lines based on (2).

6. FOREST MANAGEMENT. BUSINESS ECONOMICS OF FORESTRY. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

3609. WASSILJEW, P. W. [VASIL'EV, P. V.] Das Studium der Forstökonomie und Fragen der Forsteinrichtung in den Ländern des Sozialismus. **[The study of forest economics and management in communist countries.]** *Forst u. Jagd* 8 (7), 1958 (293–7). [G.] Transl. from a [hitherto unpublished?] Russian paper [cf. *F.A.* 19 No. 4681].

A general review of basic statistics (area of forest, increment, use of wood *per capita* etc.) for 5 European communist states and China, including a table showing the % of forest in private ownership in pre-revolutionary times and in 1956, and a list of the research institutes investigating economics and management problems and their field of work for Russia, E. Germany, Czechoslovakia, Hungary, Bulgaria, China, and N. Korea, with some data on Poland, Rumania, Jugoslavia, Albania and Vietnam.

61. Forest Management: General, Theory and Principles

See also Nos. 2991, 3214, 4009.

3610. **Symposium on compartment layout.** *N.Z. J. For.* 7 (5), 1958 (19–34).

Includes 3 papers: The concept of a compartment (*A. P. Thomson*); Species siting (*G. H. Hocking*); The effect of plantation layout on eventual logging (*J. K. Spiers*); with a résumé of the following discussion.

62. Working Plans. Annual or Periodic Yield. Yield Regulation

See also No. 3214.

3611. GROSENBAUGH, L. R. **Allowable cut as a new function of growth and diagnostic tallies.** *J. For.* 56 (10), 1958 (727–30). 6 refs.

Discusses: (1) the need to adjust allowable cut to actual growth and ultimate levels of growing stock desired; (2) the advantage of straight-line (simple interest) projection of forest stands; (3) the advantages of a new allowable-cut formula utilizing simple annual growth rates and setting forth goals and assumptions explicitly; the basic formula from which this is developed is compared favourably with the compound-interest formulae of Wahlenberg [see *F.A.* 4, p. 258] and Meyer [see *F.A.* 8 No. 2814]; (4) the need for permanent point-samples or plot-samples to provide revised data; and (5) the importance of periodic coverage of all record-units by a cheap but valuable diagnostic tally primarily silvicultural in objective, but useful in crystallizing marking prescriptions and in allocating allowable cut and available funds.

3612. MISHRA, R. S. **Determination of the extent of equi-productive coupes under Brandis' method of yield-regulation.** *Indian For.* 85 (1), 1959 (22–36). 3 refs.

Proposes two methods of determining the extent of the coupes, which are intended to supplement Sagreiya's analysis [see *F.A.* 18 No. 796].

64. Forestry as a Business: General

See also Nos. 3634, 4013.

3613. PIHA, A. Metsätulot ja maatilan pääoman muodostus. **[Forest revenue and capital formation in agricultural enterprises.]** *Acta for. fenn.* 65 (6), 1957 (1958). pp. 64. 30 refs. [Fi.g.*g.*]

A continuation of the investigations referenced as *F.A.* 9 No. 654, based on the same and some post-war

material. Forestry proceeds provided the bulk of the capital needed for agricultural investment, and these needs largely governed the time and rate of cutting, without much regard to forestry needs, sustained yield, etc. More planning, with these considerations in mind, is recommended. *From author's summary.*

65. Special Business Problems of Timber-Growing. Calculation of Costs and Profitability. Valuation

See also Nos. 3126, 3169, 3179, 3201, 3229, 3595, 3618.

3614. Vogel, P. Bodenbonitierung bei Waldzusammenlegungen. **[Assessment of soil values in consolidation schemes for forest holdings.]** *Schweiz. Z. Forstw.* 110 (1), 1959 (47–52). 3 refs. [G.f.]

Presents a scheme, which has worked well in Canton Lucerne, in which points are given for soil type, structure, drainage, depth, and humus content, and % deductions made for economic and climatic factors etc.—e.g. slope, exposure or poor accessibility. [Cf. *F.A.* 19 No. 5062.]

3615. Anderson, I. V. **Ponderosa Pine tree grades.** *Timberman* 60 (1), 1959 (56–7). 3 refs.

[Cf. *F.A.* 14 No. 2556.] Details the history and application of the author's method and describes tests for uniformity of results (90% of trainees gave lumber conversion values within $\pm 4\%$ of the mean, and close correspondence with Forest Service log grading was shown). The method now uses 6 grades. Tree grading takes $\frac{1}{8}$ as long as log grading with as accurate results.

3616. Jahr, G.-W. Zur Bewertung des Waldbodens im Flurbereinigungsverfahren. **[Assessment of the value of forest land in methods of consolidating scattered holdings.]** *Forst- u. Holzw.* 14 (4), 1959 (73–6). 15 refs. [G.f.]

Describes a points system developed in Kassel, which takes into account 11 land characteristics (e.g. aspect, inclination, soil type, moisture, soil flora, soil condition). Every piece of land can be evaluated according to this system and given an index number and a value per ha.; it can also be easily compared with different types of agricultural land, thus facilitating exchange and/or financial adjustments during the consolidation of scattered holdings.

3617. Melzer, E. Zu einigen Fragen der Waldwertschätzung in der Forstwirtschaft der DDR. **[Estimating forest values in E. Germany.]** *Arch. Forstw.* 7 (4/5), 1958 (257–75). 17 refs. [G.g.russ.e.]

A uniform procedure is required, particularly for fire and fume damage and for losses in the clearing of power-line rights of way. Classical equations of soil and growing-stock values are abandoned [cf. *F.A.* 11 No. 2387]. Though Marxist theory eliminates capital values (soil value of the nationalized land is here valued nominally at DM 1/ha.), a table is given of mean soil sale values (*Bodenpreise*) for 5 qualities of Oak, Beech, Spruce and Pine derived from the instructions of the former Reich, W. Germany, 3 provincial administrations, Melzer's formula and Landbeck's tables (based on $\frac{1}{12}$ stumpage value at rotation age). More recent methods of *stand* valuation depend on age-value curves developed from the most extensive use of cost, expectation and empirical values (*Erfahrungswerten*) and stumpage. This great simplification for objective estimation cuts out compound interest and the choice of its rate, but has the disadvantage of relying on mean values. The former Reich administration used it for assessing war damage, in combination with Glaser's formula, by substituting the age-value factor, W, (derived from the curves) for his $\frac{a^2}{u^2}$

(a = age, u = rotation) as follows: Stand value $= ((A_u - c) \times W + C) \times$ Stand density, A_u being stumpage at u, and C the formation costs (the only definitely ascertainable figures). After a critical review of the methods of six E. German administrations, the bases for a uniform procedure are discussed. A graph compares for 6 different stands of 3rd-quality Pine, 6 curves showing their value in DM through 10 years by cost summation, and 2 general curves based respectively on Landbeck's approximate values (age-value method) and on stumpage. A proposed provisional procedure for state forests damaged by fire lays down: (1) for 1- to 20-year stands: A summation of costs (costing form given); (2) for stands of $>$ 20 years, provisional application of Landbeck's approximation values by the age-value method combined with Glaser's formula; (3) in addition, for softwoods and hardwoods from ca. the 60th and 80th year respectively, the stumpage value should also be calculated for purposes of comparison. Nearer rotation age, stand values, particularly where there is a high % of quality timber, are better estimated from stumpage than from Landbeck's approximate values (too low).

66. Costing of Logging Operations

See Nos. 3227, 3231, 3244, 3246, 3248–9, 3621–2.

67. Assessment of Financial Results; Book-keeping and Accountancy; Business Statistics; Short-Term Planning and Financing

See also Nos. 3613, 3635.

3618. Abetz, K. Zur forstlichen Erfolgs- und Kostenrechnung. **[Cost accounting and profit-and-loss-accounting in forestry.]** *Allg. Forst- u. Jagdztg.* 130 (1), 1959 (1–6). 20 refs. [G.]

A lecture chiefly concerned with changes in the value of growing stock, discussing the author's own proposals, adopted by Bavaria and Brunswick, and other, more or less recent, suggestions e.g. by J. B. Chappuis [see *F.A.* 16 No. 3298], H. Krieger [see *F.A.* 19 No. 2187], H. Lemmel [see *F.A.* 19 No. 4682] and R. Frauendorfer [see *F.A.* 20 No. 2213].

68. Administration and Organization of Forest Enterprises

681. National (Federal, State) Forest Services and Administration

See No. 2685.

685. Planning and Organization of Telecommunications

See No. 3272.

686. Planning and Organization of Buildings, Transport Installations (Roads etc.)

See also Nos. 3607–8.

3619. MITCHELL, W. C., and TRIMBLE, G. R. JR. **How much land is needed for the logging transport system?** *J. For.* 57 (1), 1959 (10–1). 6 refs.

In rough mountain country in W. Virginia tree-length sawlogs were winched to permanent tractor trails bulldozed into the compartments, and were then skidded by crawler tractor and logging arch to a landing for cross-cutting. Subsequent transport was by lorry. It was calculated that, with a carefully planned system, the area devoted to skidding trails is ca. 4–5%, to lorry roads 0·9% and landings 0·6% of the whole area, which compares very favourably with the areas normally used in clear fellings in W. Virginia.

3620. LE RAY, J. Le tracé des routes d'exploitation forestière. [**The planning of extraction roads.**] *Bois For. Trop.* No. 63, 1959 (25–47). 5 refs. [F.]

A general article describing the various steps and operations in planning a road system in tropical high forests, its lay-out, alignment etc., with many illustrations, examples and recommendations. [Cf. *F.A.* 15 Nos. 3664, 3665.]

3621. BOTWIN, M. Metody określenia optymalnej sieci dróg zrębowych. [**Methods of determining the optimum density of the forest road network.**] *Sylwan* 102 (11), 1958 (11–25). 5 refs. [Pol. russ.e.]

Discusses literature [cf. *F.A.* 18 No. 4126; 19 No. 858], and describes a method of determining the feasibility of investing extra capital in road-building. Formulae and nomograms are developed to determine the optimum distance between roads.

3622. RADZIMIŃSKI, S. Zrywka drewna w świetle nowych prac badawczych. [**Timber extraction in the light of recent studies.**] *Sylwan* 102 (11), 1958 (27–44). 8 refs. [Pol.russ.e.]

Discusses studies in the German-speaking area of Europe [cf. *F.A.* 18 No. 4126; 19 No. 858], and the importance and difficulty of determining optimum road density. Strehlke's rule of thumb (economic length of road per ha. is that at which skidding costs and road costs are equal) is held to be suitable for practical purposes.

3623. SIMONSSON, B. **Power-lines over the forest.** *Unasylva* 12 (4), 1958 (174–7).

Describes the legal position, formation, and maintenance of power-line rights of way in Sweden, with particular reference to measures taken to prevent windthrow.

687. Planning and Organization of the Transport of Men, Supplies and Equipment

3624. **The Canadair 'Rat'.** *For. Equipm. Note, FAO* No. *E.*13.58, 1958. pp. 2.

Photograph and specification of a light, amphibious, articulated, tracked vehicle, suitable for all types of terrain, in winter or summer. Manufactured by Canadair Ltd., P.O. Box 6087, Montreal, Quebec, it is designed for transporting men and materials for survey parties, fire fighting etc.

3625. **Powered carrier.** *For. Equipm. Note, FAO* No. *E.*14.58, 1958. pp. 2.

Includes photographs and specification of a motor barrow developed by the U.S. Forest Service [cf. *F.A.* 19 No. 864].

7. MARKETING. ECONOMICS OF TRANSPORT AND THE FOREST PRODUCTS INDUSTRIES

72. The Quantitative Aspects of Marketing. Demand, Consumption and Supply

See also Nos. 3634, 3780, 3795.

3626. **Yearbook of forest products statistics. 1958.** FAO, Rome. 1958. pp. 185. [E.F.Span.] Price $2.50.

3627. **The hardwood market in Europe.** [*Docum.*] *16th Sess. Timb. Comm. econ. Comm. Europe, Geneva 1958* No. *TIM*/123/*Rev.* 1, 1958. pp. vi + 78 + 5 tbls., 2 gphs., 2 dgms. Restricted distribution.

A detailed report on (1) hardwood resources, (2) hardwood trade in (*a*) logs, (*b*) sawn wood, (3) consumption by total forest products, sawlogs, veneer logs, logs for sleepers, and sawn wood, from 1913 to 1957.

3628. CLAUDEL, Y. La politique forestière de la papeterie française. [**Forest policy of the French paper industry.**] *Rev. for. franç.* 11 (2), 1959 (119–24). [F.]

Includes some figures on the growth of the industry since before World War II, consumption of local and imported pulpwood and pulp (the consumption of local wood having risen from 769,000 to 3,746,000 cu.m., with that of hardwoods other than Chestnut from 25,000 to 820,000 cu.m.), and discusses measures for maintaining and increasing the supply. Part of a tax levied on paper and cardboard has been earmarked for reforestation via the *Fonds forestier national.*

73. Prices

See also Nos. 3795, 3894.

3629. Die Preisentwicklung von Fi/Ta-Stamm-, Faser- und Grubenholz in den Forstwirtschaftsjahren 1954–1958. [**Price movements of Spruce and Silver Fir stem, pulp and mining wood [in W. Germany] for the forest years 1954–58.**] *Holz-Zbl.* 84 (141), 1958 (1793). [G.]

74. Trade Policy

3630. **The Monopolies Commission. Imported timber: report on whether and to what extent the recommendation of the Commission has been complied**

with. H.M. Stationery Office, London. 1958. pp. 63. Price 3*s.* 6*d.* [Cf. *F.A.* 20 No. 2225.]

3631. **Proposal of the USSR for a draft all-European agreement on scientific, technical and economic collaboration in the timber industry.** [*Docum.*] *16th Sess. Timb. Comm. econ. Comm. Europe, Geneva 1958* No. *TIM*/139, 1958. pp. 3 + 15; No. *TIM*/139 *Add.* 1, 1958. pp. 3. Restricted.

75. Trade Customs and Usages

3632. **Forest (timber marks) regulations, 1958.** *Fiji Royal Gazette Supplement, Suva* No. 8, 1958 (51–5).

79. Economics of the Forest Products Industries

See also Nos. 2690, 3628.

3633. **Joint working party on forest and forest products statistics. Report of the *ad hoc* group of experts on end-use statistics.** [*Docum.*] *Timb. Comm. econ. Comm. Europe, Geneva 1958* No. *FAO/ECE/STATS/END-USE*/3, 1958. pp. 6+ chart + tbl.

It is recommended that statistics of wood utilization prior to the stage defined as 'end-use' be termed 'transformation statistics' rather than 'utilization statistics', to avoid confusion with utilization at the end-use stage. The collection etc. of statistics is discussed.

3634. BACKELS, J. F. **Present practices and future plans of mills to provide own pulpwood.** *Paper Tr. J.* 142 (43), 1958 (42–3). P.O.

Presents, in a graph and tables, results of a survey of 82 American firms, showing present and estimated future consumption of their own pulpwood (mean figures of 13% in 1947, 22% in 1957 and a goal of 50%), the reasons given for growing their own wood, and net changes in forest holdings 1956–57.

3635. DURGNAT, P. A. **Some aspects of Malaya's sawmilling industry.** *Malay. Forester* 21 (4), 1958 (215–30). 3 refs.

A break-down of milling and logging costs, and of revenue and expenditure for the Forest Department, is presented, to show how financial provision could be made for the cost of seasoning and grading timber.

8. FOREST PRODUCTS AND THEIR UTILIZATION

3636. ERTELD, W. Forstnutzung auf holzkundlicher Grundlage. [**Forest utilization based on the study of wood.**] Neumann Verlag, Radebeul. [1957]. pp. 402. Many refs. [G.] From *review* in *Holz-Zbl.* 85 (9), 1959 (92). [G.]

Consists of: I (pp. 15–98) Assessing the wood in the forest in relation to its properties (discussed in detail), the conditions of the site, and economic aspects; II (98–161) Conversion based on wood properties and uses, with a chapter on the E. German sorting rules of 1956 [cf. *F.A.* 18 No. 475]; III (162–79) The sale of wood, with a chapter on selling wood in a planned economy; IV (179–212) The transport of wood; V (212–330) The uses of wood, particularly veneer and sawtimber; and VI (331–371) Minor forest products, paricularly tanbark and resin.

3637. **Final report, fourth conference on wood technology. Madrid, Spain 22 April–2 May 1958.** FAO, Rome. 1958. pp. 58 + 1 set of dgms., 4 photos. Many refs. [E.]

[Cf. *F.A.* 16 No. 4447.] Subjects discussed included testing of mechanical and physical properties of timbers; testing methods for fibreboard and particle board and for veneer, plywood and other glued veneer constructions; structural grading; fire test methods for wood and wood-base materials; and sawing and machining. There is an annex: Recommended methods of test for evaluating the properties of fibreboards.

81. Wood and Bark: Structure and Properties

810. General Information on Woods

See also Nos. 2855, 2879, 2903–4, 2999, 3795.

3638. STEARNS, J. L. **Properties and uses of high-density imported woods.** *For. Prod. J.* 8 (11), 1958 (13*A*–22*A*). 26 refs.

Lists 37 species from tropical America, 21 from Africa, 25 from Asia and 8 from Oceania, with notes and tabulated properties for the more important species.

3639. **Specimen woods Nos. 276–278.** *Suppls.* to *Wood* 23 (12), 1958; 24 (1; 2), 1959. Each pp. 2.

Yellow Meranti (*Shorea faguetiana*); Incense Cedar (*Libocedrus decurrens*); and Poga (*Poga oleosa*).

3640. ARKWRIGHT, P. **Know your timber: Nos. 57–59.** *Woodwkg. Ind.* 15 (12), 1958 (693); 16 (1; 2), 1959 (43; 97). P.R.

Lingue (*Persea lingue*); Western Red Cedar (*Thuja plicata*); and Jarrah (*Eucalyptus marginata*).

3641. **Ramin [*Gonystylus* spp.]; Sao [*Hopea odorata*]; Sapeli [*Entandrophragma cylindricum*]; Sipo [*E. utile*].** Houtinstituut T.N.O., Delft. 1958. Each pp. 2. [Du.]

Additions to the series *Houtsoorten* [see *F.A.* 19 No. 2223].

3642. SRIBURI, T. [**[Description of] the wood of reserved [forest] species of Siam.**] *Vanasarn* 16 (3), 1958 (69–72). [Siam.e.]

Scientific and trade names, characteristics and distribution of the tree, appearance (naked eye and × 10) of the wood, lb./cu. ft. (air dry) and chief uses of *Dalbergia oliveri, D. cochinchinensis, Irvingia malayana* and *Michelia champaca.* [Cf. *F.A.* 19 No. 3369.]

3643. CHOWDHURY, K. A. **The third draft on 'nomenclature' of commercial timbers [in the S.E.**

Asia/Pacific region]. [*Docum.*] *4th Sess. FAO Asia-Pacif. For. Comm., Bandung 1957* No. *FAO/APFC*-57/3, 1957. pp. 42. Limited distribution.

Gives for 423 species, (1) botanical name, (2) mean weight at 15% m.c. in lb./cu. ft., (3) standard export name within supplying country, and sources of supply, (4) alternative commercial names, (5) recommended standard name if different from (3).

3644. **Nomenclature of Uganda timbers**. *Bull. For. Dep. Uganda* No. 6, 1958. pp. 29.

Lists, with the standard or suggested standard, the trade and native names of > 70 species, with notes on weight, distribution, frequency etc.

3645. MAINIERI, C. I—Madeiras denominadas Caixeta. [**I—Timbers called 'Caixeta'.**] *Publ. Inst. Pesqu. tec. S. Paulo* No. 572, 1958. pp. 94. 54 refs. [Port.]

The name 'Caixeta' is given in southern Brazil to wood of species belonging to 13 different genera. Macroscopic and microscopic studies are presented of the following important species belonging to this category: *Zschokkea* spp., *Jacaranda* spp., *Tabebuia* spp., *Alchornea* spp., *Croton* spp., *Tetrorchidium* spp., *Mastichodendron* spp., *Simaruba* spp. and *Symplocos* spp. Short descriptions are also given of further timbers sometimes called 'Caixeta', viz. *Didymopanax* sp., *Schizolobium excelsum*, *Cecropia* sp., and *Tibouchina* sp. Data on the mechanical properties of the species studied, and a short glossary of terms are appended.

3646. SILVA, A. A. A cabriuva. [**Cabriuva.**] *Brasil madeireiro* No. 124, 1958 (29). [Port.]

The name 'Cabriuva' is used for *Myroxylon toluiferum*, *M. peruiferum*, *Myrocarpus fastigiatus* and *M. frondosus*. The two former produce timber of first-class quality under the name of 'Cabriuva vermelha'; and the two latter timber of slightly inferior quality under the names 'Cabriuva amarela' and 'Cabriuva parda'. Short notes are presented on the botanical characteristics of the trees and of their products.

3647. KONDRATJUK, Ė. M. Do harakterystyky derevyny dejakyh vydiv sosny. [**The characteristics of the wood of certain species of Pine.**] *Dopovidi Akademiji Nauk Ukrajins'koji RSR Kyjiv* [*Kiev*] 1957 (6), (595–7). 3 refs. [Ukr.russ.e.] N.L.L.

Briefly discusses the taxonomy of *Pinus sylvestris s.s.*, and the varieties *fominii*, *rostellata*, *zerovii*, and *cretacea* on the basis of wood characteristics. The strength of *P. sylvestris s.s.*, *P.s.* var. *fominii* and *P.s.* var. *cretacea* is determined on the basis of the early-wood/late-wood ratio.

3648. **Properties of thinnings of home-grown European Larch (*Larix decidua*). Progress report 1—Consignment No. 940.** Forest Products Research Laboratory, Princes Risborough. 1958. pp. 10 + 3 tbls., 7 photos.

Timber of 48-year trees from New Abbey, Dumfries, was 2½–3½ lb./cu. ft. denser than slightly older Japanese Larch already examined [see *F.A.* 20 No. 2240], and superior in strength properties, especially stiffness and resistance to shock loading. The presence of canker spoiled its appearance when sawn, and small encased knots caused degrade and showed the need for early pruning.

3649. URSULESCU, A., and PANĂ, G. I. Proprietăţile lemnului de cer şi posibilităţile de utilizare in industrie. [**Wood properties of *Quercus cerris* and the possibility of its use in industry.**] *Industr. Lemn.* 6 (12), 1957 (436–43). 12 refs. [Rum.russ.g.f.e.]

Extensive tests on physical and mechanical properties of Rumanian-grown *Q. cerris* (test data given in 10 tables) indicate that they are comparable with those of *Q. sessiliflora*, whereas natural durability is rather inferior though superior to that of Beech. Suggestions are made for industrial use, e.g. car-body and furniture manufacture, veneer, cooperage etc.

3650. KUKACHKA, B. F., and KRYN, J. M. **Foreign wood series. Cativo. *Prioria copaifera* Gris**. *Rep. U.S. For. Prod. Lab., Madison* No. 1998 (rev.) 1958. pp. 7 + 1 tbl. 8 refs. P.R.

3651. *Eucalyptus saligna* Sm. et *Eucalyptus grandis* Maiden. [***E. saligna* and *E. grandis*.**] *Bois For. Trop.* No. 63, 1959, (17–21). [F.]

3652. **East African Olive (*Olea hochstetteri* Bak.). Consignment 893**. Forest Products Research Laboratory, Princes Risborough. 1958. pp. 6. Limited distribution. P.R.

Gives brief notes on distribution, a general description of the wood, and data on seasoning, mechanical, bending and working properties, resistance to insect attack, and natural durability; discusses its use for veneer and plywood, and suggests possible uses.

3653. P[ICCAROLO], G. Prove tecnologiche per alcuni cloni di pioppo. [**Technological tests on some Poplar clones.**] *Cellulosa e Carta* 9 (11; 12), 1958 (9–22; 15–27). [It.f.e.g.]

The test data include lignin chemistry, wood anatomy (with photomicrographs), stem form, bark %, physical and mechanical properties, working properties, and pulping properties, and the clones dealt with are *Populus* × *euramericana* (Dode) Guinier I-37, I-154, I-214, I-455, I-476 and I-488 and *P.* × *euramericana* 'f. monilifera'.

811. Structure, Identification

See also Nos. 3647, 3653, 3669, 3672.

3654. FREY-WYSSLING, A. **Wood microtechnology**. *News Bull. int. Ass. Wood Anatomists* 1958 (2), (6–8). 14 refs.

A very brief review of new techniques, with literature references.

3655. BEALS, H. O., and GUARD, A. T. **An abrasive paper technique for preparing sections of wood for microscopic study**. *Stain Technology, Baltimore* 33 (3), 1958 (103–8). 5 refs. O.R.S.

The technique (in which the section is impregnated with resin before grinding by hand with abrasive paper) is described in detail. Good results have been obtained with Pleistocene wood and woods containing alternating bands of hard and soft tissue, both

difficult to handle by ordinary methods. Photomicrographs of *Pinus palustris* sections are given.

3656. ECHOLS, R. M. **The ampliscope—an instrument for wood-fiber measurements.** *J. For.* 57 (1), 1959 (43–4). 1 ref.

Wood samples are macerated, stained, and mounted on microscope slides and these are placed in the ampliscope (details of construction given) which projects them at a × 25 magnification on to a screen where fibre dimensions can be more easily measured. The average time for measuring and recording the lengths of 50 fibres (Scots Pine) from one slide was < 2 min.

3657. NORMAND, D. Anatomie du bois et taxinomie. II. **[Wood structure and taxonomy. II.]** *J. Agric. trop. Bot. appl.* 5 (4/5), 1958 (297–303 + 3 plates). [F.] P.O.

Discusses briefly the ecology and distribution of *Didelotia unifoliolata*, *Tetraberlinia tubmaniana* and *Decorsella paradoxa*, gives detailed descriptions of the wood anatomy of each, and discusses their affinities with other species on an anatomical basis.

3658. FERREIRINHA, M. P., and FREITAS, M. C. P. G. DE. Contribuição para o estudo anatómico das madeiras da Guiné Portuguesa. **[The anatomy of timbers of Portuguese Guinea.]** *C.R. 6ième Sess. Conf. int. Afr. Ouest* Vol. 3, 1956 (107–14 + 1 tbl. + 4 plates). [Port.span.f.e.]

A macroscopic and microscopic study of the woods of *Erythrophleum guineense*, *Lophira alata*, *Cordyla africana*, *Afzelia africana*, *Chlorophora regia* and *Pterocarpus erinaceus*.

3659. SOPER, K. **Comparative morphology of the New Zealand species of *Pseudopanax* and *Nothopanax*.** *Transactions of the Royal Society of New Zealand, Wellington* 84 (4), 1957 (749–55 + 1 plate). 24 refs. O.R.S.

From a comparison of leaves, inflorescences, flowers, nodal structure and wood histology, *Nothopanax* and *Pseudopanax* spp. were divided into 5 groups. Descriptions of secondary wood are tabulated for one member of each group: *N. edgerleyi* (considered to be the most primitive), *N. colensoi*, *N. lineare*, *P. lessonii* and *P. crassifolium*. It is suggested that all 5 groups should be treated as sections of a single genus.

3660. CARLQUIST, S. **The woods and flora of the Florida Keys: Compositae.** *Trop. Woods* No. 109, 1958 (1–37 + 1 plate). 14 refs.

[Cf. *F.A.* 18 No. 4518.] Describes the external morphology and anatomy of 13 species of the tribes Eupatoreae, Heliantheae and Inuleae, all low shrubs or herbs developing some secondary xylem. The taxonomic relations of each are discussed.

3661. STERN, W. L., and BRIZICKY, G. K. **The woods and flora of the Florida Keys: Goodeniaceae.** *Trop. Woods* No. 109, 1958 (38–44 + 1 plate). 14 refs.

External morphology, internal anatomy and taxonomic relations of *Scaevola plumieri*, a fleshy-leaved low shrub of the sea shore. Wood characters are compared in a table with those of 3 other species.

3662. STERN, W. L., and BRIZICKY, G. K. **The woods and flora of the Florida Keys: Passifloraceae.** *Trop. Woods* No. 109, 1958 (45–53 + 2 plates). 12 refs.

Morphology, stem ontogeny and xylem structure of *Passiflora multiflora*, a woody liane, with a discussion suggesting the necessity for a taxonomic re-evaluation of the family.

3663. FAHN, A. **Xylem structure and annual rhythm of development in trees and shrubs of the desert. I. *Tamarix aphylla*, *T. jordanis* var. *negevensis*, *T. gallica* var. *maris-mortui*.** *Trop. Woods* No. 109, 1958 (81–94 + 2 plates). 12 refs.

The anatomy (including specific distinctions) of these diffuse- to semi-ring-porous species is described. Cambial activity is practically continuous, and when it is lowest, the starch content of the peripheral xylem is highest. Growth-ring initiation coincides with new shoot growth.

811.1. Anatomical Elements and Tissues

See also Nos. 2756, 2795, 2811, 3208, 3347–8, 3741–2, 3854, 3890, 3896–8, 3901, 3908, 3916.

3664. TATISHVILI [TATIŠVILI], E. M. **Connection between physico-mechanical properties and characteristics of anatomical structure of wood.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 4035, 1958. pp. 4. 3 refs. Transl. by M. Slade from *Izvestija Akademija Nauk Armjanskoj SSR* (*Biologičeskie i Sel'skohozjajstvennye Nauki*) 10 (3), 1957 (85–8). Limited distribution.

Gives tabulated data for 11 *Eucalyptus* spp. showing for most of them a relation between the % of solid-wood volume (i.e. volume of the walls of fibres, vessels and parenchyma cells as compared with that of cavities) and the physico-mechanical properties of density, volumetric shrinkage, compression and hardness, lowest values for these properties being found for *E. antipolitensis* with 29·6% solid-wood volume and the highest for *E. cinerea* (54·8%). No conclusion was drawn on the effect of the rays on the mechanical properties, as *E. antipolitensis* and *E. cinerea* have an approximately equal content by volume.

3665. KLAUDITZ, W. Über den Ligningehalt des Festigungsgewebes einiger Laubhölzer. **[The lignin content of the mechanical tissue of some hardwoods.]** *Holzforschung, Berlin* 12 (6), 1958 (161–6). 6 refs. [G.g.e.] P.R.

[Cf. *F.A.* 19 No. 2316.] The wood of *Populus* × *marilandica*, *Alnus incana*, *Betula verrucosa*, *Carpinus betulus*, *Fagus sylvatica* and *Liriodendron tulipifera* was investigated to discover whether, and by how much, the lignin content of the mechanical tissue increases in anatomically different species, if the volume and weight % of the peripheral compound middle lamella (rich in lignin) increase in relation to the cell-wall substances of the sclerenchymatous fibres. Anatomical measurements and chemical analysis revealed that a certain relation does exist between the lignin content and the anatomy, but experimental deficiencies prevented definite conclusions.

3666. LEWIN, M. **The middle lamella of the bast fibers.** *Tappi* 41 (8), 1958 (403–15). 75 refs. P.R.

A critical review of the morphology and chemical composition of the middle lamella, and its effect on bleaching, biological stability, chemical reactivity, effects of irradiation, swelling, mercerization, moisture regain, crimp, Young's modulus, and strength properties. *From author's summary.*

3667. NEČESANÝ, V. **A note on the structure of microfibrils in native cell walls.** *Svensk PappTidn.* 62 (3), 1959 (73–6). 11 refs. [E.e.sw.g.] P.R.

Discusses and illustrates with photomicrographs the structures shown by the electron microscope on the inner surface of lignified cell-walls of very young wood of *Acer campestre* and *Populus nigra*, concluding that the fibre-like structures are individual microfibrils or bundles of microfibrils cemented together and covered with amorphous or partly crystalline cell-wall components (hemicelluloses), and the broader parts, accumulations of hemicelluloses or cellulose of low crystallinity. Their origin and orientation are discussed.

3668. KANTOLA, M. Koivun normaalipuun ja reaktiopuun kuiturakenteesta. [**The fibre structure of normal Birch wood and tension wood by X-ray diffraction technique.**] *Pap. ja Puu* 40 (9), 1958 (431–6). 8 refs. [Fi.e.] P.R.

Samples of normal and tension wood were taken in pairs from the same height and annual ring but from opposite sides of the same tree, and X-ray diffraction diagrams were made. The spacings calculated from the diffraction rings show that they are lines from cellulose I. The diagrams of tension wood are typical fibre diagrams from well oriented crystallites parallel to the fibre axis so that the length of the *b*-axis in the unit cell of cellulose can be calculated from the layer-line spacings. The average angle of orientation and the orientation factor have been calculated. *From author's summary.*

3669. LIESE, W. **Taxonomic significance of the submicroscopic verrucose structure in the genus *Pinus* L.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 3987, 1958. pp. 14 + 7 photos. 28 refs. Transl. by M. Slade from *Holz Roh- u. Werkstoff* 14 (11), 1956 (417–24). [See *F.A.* 19 No. 2257.] Limited distribution.

3670. LIESE, W. **The fine structure of hardwood pits.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 3926, 1958. pp. 8 + 1 dgm., 8 photos. 13 refs. Transl. by J. Hardy from *Holz Roh- u. Werkstoff* 15 (11), 1957 (449–53). [See *F.A.* 20 No. 2265.] Limited distribution.

3671. CÔTÉ, W. A., JR. **Electron microscope studies of pit membrane structure. Implications in seasoning and preservation of wood.** *For. Prod. J.* 8 (10), 1958 (296–300). 16 refs.

Reports on a study that largely confirms the views of other workers, which are discussed. Two methods employed are described. In the replica method, the surface is represented by a carbon film, enhanced by pre-shadowing with a heavy metal, on the basis of a polysterene impression. In the pseudo-replica method, actual thin lamellae of wood accidentally adhering to the polysterene film were part of the material studied. The following are illustrated: an ultra-thin section through the torus of a bordered pit of *Pinus strobus*, and the membrane in a half-bordered pit, showing traces of a microfibrillar structure; a bordered pit in *P. ponderosa* with bacterial bodies enmeshed in the strands of the supporting membrane; a membrane from a bordered pit in *Sequoia sempervirens* heartwood; and intervessel pits in *Tilia americana*.

3672. EICKE, R. Beitrag zur Kenntnis der submikroskopischen Struktur Araucariaceenhölzer. [**The ultramicroscopic structure of woods of the Araucariaceae.**] *Ber. dtsch. bot. Ges.* 71 (6), 1958 (231–40 + 3 plates). 36 refs. [G.g.] O.B.D.

The structure of tracheids in secondary wood of the stem of Araucariaceae was studied by means of an ordinary and an electron microscope. The bordered pits are thickly crowded together in the neighbourhood of the medullary rays and at the end of the cells. Each pit membrane in this part of the tracheid is separated from the next one by a strip of wall only 0·1μ wide. The structure of the pit membrane of *Araucaria araucana* is characterized by the radial arrangement of the microfibrils. They even extend over the central section, which is thickened by depositions. The pit membrane of *Agathis australis* shows the radial course of the microfibrils even more clearly, since no thickenings are present, there being no torus; the texture resembles that of the pit membranes of *Gnetum gnemon*, which also lacks a torus and thickenings. The divergence in pit-membrane structure from that of the Abietaceae is far greater in *Agathis australis* than in *Araucaria araucana*. The special character of the pit membrane structure supports the theory that the Araucariaceae hold an intermediate position in the phylogeny of the Coniferae.

3673. SEBASTINE, K. M. **Studies on the vessel variations in dicotyledonous trees.** *J. Indian bot. Soc.* 37 (1), 1958 (104–13 + 2 plates). 15 refs. O.B.D.

Presents data on: (1) mean number of vessels per unit area at different levels of the stem and in different parts of the same level (2) mean diameter of vessels, and (3) vessel-member length in *Pajanelia rheedii*, *Macaranga peltata*, *Erythrina stricta*, *Tabernaemontana dichotoma* and *Anacardium occidentale*.

3674. OLLINMAA, P. J. Vertailevia tutkimuksia puusyiden pituudesta hieskoivun kevät- ja kesäpuussa. [**Comparative studies on the length of wood fibres in early and late wood of Birch.**] *Pap. ja Puu* 40 (11), 1958 (599–601). 10 refs. [Fi.fi.e.] P.R.

Measurements on 2 trees showed no appreciable difference in fibre length between early and late wood and normal and tension wood.

3675. GRZECZYŃSKI, T., and MARCINIAK, H. Obserwacje nad kurczeniem się promieni rdzeniowych w drewnie bukowym (*Fagus silvatica*). [**Observations on the shrinking of medullary rays in the wood of *F. sylvatica*.**] *Sylwan* 102 (12), 1958 (43–8). 4 refs. [Pol.pol.russ.e.]

Describes a characteristic shrinkage of the rays as seen in the radial section of air-dry Beech,

causing the growth rings at those points to arch inwards towards the pith. Tests with absolutely dry and saturated samples showed that neither drying nor soaking had any effect on this arching. It is concluded that the shrinkage of the rays is directly connected with tensions inherent in living trees.

811.2. Special Features and Abnormal Structure

See also Nos. 3352, 3668, 3674.

3676. DADSWELL, H. E., WARDROP, A. B., and WATSON, A. J. **The morphology, chemistry and pulp characteristics of reaction wood.** *Repr.* from *Fundamentals of Papermaking Fibres*, British Paper & Board Makers' Association. 1958. pp. 187–219. 46 refs.

3677. WERGIN, W. Über Entstehung und Aufbau von Reaktionsholzzellen. I. Ernährungsphysiologische Versuche zur Bildung von Zugholzzellen bei Sämlingen der Rosskastanie. **[The origin and constitution of reaction-wood cells. I. Experiments on the effect of nutrition on the formation of tension-wood cells in Horse Chestnut seedlings.]** *Faserforschung und Textiltechnik, Berlin* 8 (7), 1957 (257–62). 16 refs. [G.g.russ.e.] L.S.

Aesculus hippocastanum seedlings, grown in a greenhouse, were watered with Knop nutrient solution at normal, half, or double concentrations. When a constant stream of air from one direction was provided to prevent upright growth, tension-wood (t.w.) cells, characterized by a thick cellulose layer containing no lignin, were formed both in these and in control plants growing undisturbed, indicating that t.w. was not induced by forces of gravity. The different nutrient solutions had no effect on t.w. formation, but a connexion was noted between plants having spasmodic growth and t.w. formation, while plants growing at a steady rate formed little or none. Growth differences in plants under uniform external conditions must therefore be brought about by internal factors, and research has begun on the influence of growth substances and inhibitors on t.w. formation.

811.4. Growth Rings. Early and Late Wood

See also Nos. 3588–9, 3674, 3698, 3742–3.

3678. GUARD, A. T., and POSTLETHWAIT, S. N. **Relation of the formation of annual rings to multiple flushes of growth in several species of *Quercus*.** *Proc. Indiana Acad. Sci.* 67, 1957 (1958), (104–6). 3 refs. L.S.

Branches of *Quercus palustris*, *Q. bicolor* and *Q. macrocarpa* having two growth flushes in 1957, as shown by the formation of two scaly terminal buds, were cut and the wood examined. Where a full winter season had occurred between flushes, the ring-porous condition characteristic of these species existed, whereas no clear line of demarcation was visible between the xylem of the first and second increments in the branches examined. The absence of false rings may be due to the relatively short duration of time (< one month) between cessation and renewal of growth. In the species studied, renewed periods of terminal and cambial growth do not necessarily bring about the formation of false annual rings. [Cf. *F.A.* 19 No. 2265.]

811.5. Sapwood and Heartwood

See No. 3564.

811.7. Phloem; Bark

See No. 3666.

812. Physical and Mechanical Properties

See also Nos. 3653, 3664, 3726, 3880, 3896–8, 3908.

3679. TUSET, R. Caracteres físico-mecánicas de algunas maderas de interés común en el Uruguay. **[Physical and mechanical properties of some timbers of common interest in Uruguay.]** *Revista de la Asociación de Ingenieros Agrónomos, Montevideo* 30 (102), 1958 (28–42 + 1 tbl.). [Span.]

From literature published from 1931 onwards, data have been collected, and are here published, on 79 native and foreign species.

3680. NÁJERA ANGULO, F., *et al.* Sección de maderas: características y aplicaciones. Estudios referentes a la desecación artificial y aplicaciones de la madera de los '*Eucalyptus camaldulensis* y *globulus*'. **[Wood section: properties and uses. Studies of artificial drying and uses of wood of *Eucalyptus rostrata* and *E. globulus*.]** *An. Inst. for. Invest. Exp., Madrid* No. 2, 1957 (97–110 + 7 tbls.). [Span.]

Reports results of experiments with different kiln-drying schedules in order to avoid collapse in wood of *E. rostrata* and *E. globulus*, and of investigations of the physical and mechanical properties of *E. rostrata* to test its suitability for railway sleepers. Experiments are also described in which *E. rostrata* was subjected to cycles of alternate steeping in water and drying in order to estimate its natural durability.

812.1. Optical, Acoustic, Frictional, Thermal and Electrical Properties

See also Nos. 3697, 3702, 3781, 3812.

3681. LUTZ, J. F. **Color in Walnut veneer.** *Veneers & Plyw.* 52 (11), 1958 (15, 21–2). P.R.

Discusses the difference in natural colour between veneers of *Juglans nigra* and *J. regia*, changes in colour during manufacture, and bleaching.

3682. KOLLMANN, F., and MALMQUIST, L. Über die Wärmeleitzahl von Holz und Holzwerkstoffen. **[On the heat conductivity of wood and wood-based materials.]** *Holz Roh- u. Werkstoff* 14 (6), 1956 (201–4). 10 refs. [G.] P.R.

Discusses the physical factors involved and, introducing a 'bridge factor' to account for the different arrangement in space of fibres in solid wood, particle board etc., develops a theoretical formula for conductivity in relation to density and m.c. This was found to fit statistical values (observed in the range 5–55% m.c.) and empirical equations based thereon, quite well.

3683. JENTZSCH, H. Brand- und Explosionsgefahren durch Holz an Land und auf See. **[Fire and explosion dangers from wood on land and sea.]**

Holz Roh- u. Werkstoff 14 (6), 1956 (223–32). 21 refs. [G.g.] P.R.

Discusses the different fire behaviour of various woods (citing as examples of woods having high ignition points *Musanga* and *Lophira* spp.) and other building materials. Includes also a brief mention of tests at Göttingen in which Beech dust of 60–100μ was blown against a spark source and serially photographed (1000 exposures/sec.) which showed ignition to take place, not at the particle surface, but in the gaseous or vapour zone, as with liquids. [Cf. *F.A.* 16 No. 2167.]

812.2. Behaviour with Liquids and Gases. Moisture Relations etc.

See also Nos. 2718, 3675, 3693, 3696, 3891.

3684. JOHNSTON, D. D., and WYNANDS, R. H. **Determination of moisture in timber. A comparison of electrical resistance and oven-drying methods.** *Wood* 23 (11), 1958 (458–62). 6 refs.

The sources of error in measuring m.c. by the electrical-resistance method are discussed. They are: differences in resistance within and between species; uneven distribution of moisture; temperature variation; the presence in specially treated wood of certain chemicals; and poor contact between the meter and the wood. The desirability of average correction figures for species is discussed, and a table presented of comparisons between readings of commercial moisture meter and m.c.'s as determined by oven-drying, for 119 species. The samples were conditioned previously at 25° C. and 90% r.h., and 25° and 60% r.h.

3685. MOCANU, V., and CATRINA, I. Contribuţii la studiul umidităţii lemnului în picioare la cîteva specii forestiere. **[The moisture content of wood in standing trees of several forest species.]** *Rev. Pădurilor* 1958 (9), (535–6). [Rum.russ.g.f.e.]

Specimens were taken in September in different parts of Rumania, with a Pressler borer, at 2-m. intervals from base to apex of two trees (40–50 years old) of (1) *Larix decidua*, (2) *Pinus nigra*, (3) *P. sylvestris*, (4) *P. strobus*, (5) *Picea abies*, and (6) *Abies alba*. Results are graphed and discussed. The general trend was from a moderately high m.c. at the base falling to a minimum at ca. 4 m., and then rising, with more or less fluctuation, towards the apex (14–16 m.). Values in % for the different species ranged as follows: (1) 34–52, (2) 45–103, (3) 46–96, (4) 72–105, (5) 71–161, and (6) 77–190%.

3686. BERKEL, A. Belgrad Ormanında meşe, kayın, gürgen, kestane, akasya ve kızîlagaç gövdelerinde su miktarları ve dagışılı hakkında araştırmalar. **[The distribution of moisture content in cross-sections at varying heights in Oak, Beech, Hornbeam, Chestnut, Black Locust, and Alder in the Belgrade Forest [near Istanbul].]** *Istanbul Üniv. Orm. Fak. Derg.* 8*A* (1), 1958 (49–68). 1 ref. [Turk.g.*g*.]

An analysis of various cross-sections from one stem each of *Quercus robur*, *Fagus orientalis*, *Carpinus betulus*, *Castanea sativa*, *Robinia pseudoacacia* and *Alnus glutinosa* felled in spring. Mean m.c. was lowest in Robinia heartwood (38·3%) and highest in Alder (107). Except in Hornbeam, m.c. increased from the centre outward, and the top downward.

3687. HARTWIG, G. Waarnemings oor die ewewigsvoggehalte van hout en hoe dit gedurende die jaar skommel. **[Observations on the equilibrium moisture content of wood and its seasonal fluctuations.]** *J. S. Afr. For. Ass.* No. 31, 1958 (24–46). 8 refs. [Afrik.afrik.e.]

Describes tests with plants of *Eucalyptus diversicolor*, *E. maculata*, *E. saligna*, *Pinus roxburghii* and *P. pseudostrobus* at Stellenbosch, quarter- and flat-sawn, planed and rough, and stored indoors, outdoors under cover, and in the open. The highest m.c. registered, in planks lying flat in the open, was 77·4% in winter, the lowest m.c. in the same lot, 6·02% in the summer. Mean equilibrium moisture content (e.m.c.) in the open was 18–19% for Pines, 13–14·5 for Eucalypts; indoors from 11·5 to 11·75, and 12 to 12·5 respectively over the year. After oven-drying, Pines absorbed water much faster than Eucalypts; e.m.c. values after one year were 9·81 and 8·5 respectively. *From author's summary.*

3688. **The movement of timbers.** *Leafl. For. Prod. Res., Lond.* No. 47 (rev.) 1958. pp. 7. [Cf. *F.A.* 16 No. 3366.]

3689. BOOTH, H. E. **Shrinkage of New South Wales timbers.** *Bull. For. Comm. N.S.W.* No. 3, 1958. pp. 23.

The main table lists 181 species (alphabetically by their standard trade names) giving radial, tangential and volume shrinkage from green to air-dry (12% m.c.), green to oven-dry, and green to the reconditioned state, and a classification into radial and tangential shrinkage classes. Further tables give appropriate cutting allowances, and a list of species in ascending order of tangential shrinkage.

3690. BOUTELJE, J. Rechnerische Betrachtungen über die Schwankung der maximalen Raumquellung bei der Kiefer (*Pinus silvestris* L.). **[Statistical considerations on the variation in maximum swelling in Pine.]** *Holz Roh- u. Werkstoff* 16 (11), 1958 (413–8). 26 refs. [G.g.e.] P.R.

Investigations were made on disks from various heights in two Pines ca. 70 years old. Multiple regression analysis of density and position in the stem (i.e. number of rings from the pith) on the one hand, and maximum swelling (m.s.) on the other, showed that only in the sapwood (s.w.) samples did a significant correlation exist between position and m.s. The relationship of the two values was inversely proportional, and might be caused by the increasing ring width from pith to bark in the trees examined. A relationship between ring width and m.s./density was found, but needs further experiments to confirm its validity. No correlation was found between late wood % and m.s./density. The ratio of m.s. to density is greater for s.w. than for heartwood (h.w.), but this is not solely caused by the greater % of resin in the h.w. Extraction of resin does not seem to affect the swelling values of h.w. significantly, and consequently the differences in swelling values between h.w. and s.w. appear to

arise from causes other than the difference in resin %.

3691. PAERELS, F. Arbeitssparendes Verfahren für die Messung der Dickenquellung. **[A labour-saving method for the measurement of swelling.]** *Holz Roh- u. Werkstoff* 15 (9), 1957 (367–70). [G.g.e.] P.R.

Describes an apparatus for measuring swelling ⊥ to surface of [fibre or particle] boards, which automatically registers swelling-time curves.

812.3. Density. Specific Gravity. Buoyancy

See also Nos. 2811, 3690, 3698, 3742–3, 3897.

3692. BENSON, J. L., WALLIN, W. B., and SHIUE, C.-J. **Volume determination of green wood specimens.** *Minn. For. Note* No. 73, 1958. pp. 2.

When determining sp. gr. of Aspen wood it was found that erroneous sp. gr. values were obtained when green discs of wood were not soaked before volume determination, since part of the water displaced is absorbed by the wood and is not recorded as displaced water.

3693. ENČEV, E. A. Proverjavane na rezultatite za obemnoto teglo v absoljutno suho săstojanie, uslovnoto obemno teglo i obemnoto săsăhvane ili nabăvane na dărvesinata. **[Test values obtained for oven-dry density, nominal density, volume shrinkage and swelling of wood.]** *Izv. Inst. Gorata bălg. Akad. Nauk., Sofia* No. 2, 1957 (363–70). 11 refs. [Bulg.russ.g.]

Presents formulae for verifying values determined in tests of these physical properties.

812.7. Strength Properties

See also Nos. 3742, 3799, 3853, 3887, 3892.

3694. SCHNIEWIND, A. P. **The strength and related properties of Tanoak [*Lithocarpus densiflorus*]. I. General description and related properties in the green condition.** *Calif. For. & For. Prod. Calif. For. Prod. Lab.* No. 7, 1958. pp. 4. 21 refs.

Gives comparative, tabulated results of the present and 3 other studies.

3695. VENET, J. Étude de la résistance mécanique des bois de mine en fonction des facteurs de la production forestière. **[The mechanical strength of mine timbers in relation to growth factors.]** *Ann. Éc. Eaux For. Nancy* 16 (1), 1958. pp. 338. 30 refs. [F.g.e.] Also an abridged version in *Rev. for. franç.* 10 (12), 1958 (765–82).)

[Cf. *F.A.* 13 No. 2488.] After a description of the material tested (> 15,000 specimens comprising > 40 species of conifers and hardwoods, mainly indigenous to or grown in France, from a wide range of sites) and the tests employed (static bending and compression ||), detailed results are given by species and provenances. The final section discusses the effect on mechanical strength of various growth factors and effects (e.g. ring-width, timber length/diameter ratio, taper, sweep, excentricity, knots, spiral grain, shakes, moisture content, decay). There is a 10-page English summary.

3696. FREJDIN, A. S. Dejstvie radioaktivnogo izlučenija na fiziko-mehaničeskie svojstva drevesiny. **[The effect of radioactive radiation on the physical and mechanical properties of wood.]** *Derev. Prom.* 7 (9), 1958 (13–5). 8 refs. [Russ.] P.R.

Discusses some Russian, English and American investigations on the subject, and gives details of the strength and swelling pressure of Scots Pine and Ash subjected to various doses of radiation. From statistically treated results, a table is drawn up showing the decrease in wood strength under (*a*) shear parallel, (*b*) static bending, and (*c*) compression parallel, for [unspecified] specimens given from 50 to 500 mega-r.e.p. Results (given in kg./sq. cm. in the order: control, 50 mega-r.e.p., 500 mega-r.e.p.) were for (*a*) 74·8, 56·7, 22·5; (*b*) 825, 660, 83·5; (*c*) 365, 385, 260·5. [Cf. *F.A.* 20 No. 3715.]

3697. NARAYANAMURTI, D., and NARAYANAMURTI, V. **Vibration method to detect modifications in wood.** *Werkstoffe und Korrosion, Weinheim/Bergstr.* 9 (May), 1958 (262–5). [G.e.] From *abstr.* in *Prev. Deterior. Abstr.* 16 (2), 1958 (*Wood* 6). P.R.

[Cf. *F.A.* 16 No. 909.] Studies the effects of the following preservative or chemical treatments on torsional fatigue strength [t.f.s.] (elastic shear modulus and logarithimic decrement of torsion) of 30 softwood and hardwood species: (1) soaking for 12 hr. in 40% phenol-formaldehyde solution in alcohol, air drying, then 10 min. hardening at 140–150° C. under pressure; (2) soaking in 3% hot H_3BO_3 for 15 hr. and drying at 100°; (3) water storage at 50° for 8 weeks in the presence of iron filings; (4) soaking in 4, 5 or 8% NaOH solutions for 2 weeks; and (5) soaking in 6, 15 or 20% H_2SO_4 for 4 weeks. Treatment (1) increased the shear modulus by 100 to almost 200%; in (2) the t.f.s. was increased by ca. 50% with a corresponding decrease in the logarithmic decrement, presumably because of the formation of B compounds in the wood; treatment (3) also increased the t.f.s. with a corresponding decrease of the logarithmic decrement. Generally, alkali resistance is much lower than acid resistance and, of the species studied, *Taxus baccata*, *Cryptomeria japonica*, *Terminalia bialata* and *Dalbergia latifolia* showed the highest, and *Sterculia alata*, *Schrebera* spp., *Alnus nitida*, *Gluta travancorica*, *Stereospermum chelonoides* and *Dichopsis elliptica* the lowest resistances to acid and alkali solutions.

3698. YLINEN, A. Über die Beziehungen zwischen Spätholzanteil, Rohwichte und den elastischen Konstanten bei Holz mit ausgeprägtem Jahrringbau. **[Relationships between proportion of late-wood, density and elastic constants in wood with distinct annual rings.]** *Holz Roh- u. Werkstoff* 14 (6), 1956 (205–7). 5 refs. [G.g.] P.R.

Discusses these relationships and develops general formulae on the basis of the theory of elasticity and the assumptions made in a previous paper [cf. *F.A.* 16 No. 2185].

3699. LITTLEFORD, T. W. **An analysis of variation in moduli of elasticity and rupture in young Douglas Fir.** *Abstr. of thesis*, in *For. Chron.* 34 (3), 1958 (335–6).

The results of 258 static-bending tests on 22 Douglas Fir (7 of 60 years, 8 of 70, and 7 of 90),

were analysed. Wood from the inner zone (the first 5 in. of radial growth) had a faster growth rate, lower density, and less strength and less stiffness in bending than wood from the outer zone. Ring width and width of late wood accounted for a significant amount of variation in modulus of elasticity and modulus of rupture in both zones. Their influence on both moduli, however, was due largely to their association with sp. gr., which accounted for almost twice as much of the variation in elasticity and bending strength as did ring width and width of late wood combined.

3700. KOLLMANN, F., and SEKHAR, A. C. Untersuchungen über die Zähigkeit von Hölzern—Dritte Mitteilung: Der Einfluss verschiedener Faktoren auf die Ermittlung von Izod-Werten. **[Investigations on the toughness of wood. III: The influence of different factors on the determination of Izod values.]** *Holz Roh- u. Werkstoff* 16 (10), 1958 (365–71). 7 refs. [G.g.e.] P.R.

Continuing earlier work [see *F.A.* 16 No. 4517] the variations in the Izod value (*I*) of standard test-pieces of several Indian woods were found for varying (*a*) V-notch angle, (*b*) direction of impact in relation to the annual rings, and (*c*) wood m.c. No significant change was noted in *I* with increase in (*a*) in woods of low impact resistance; with tougher woods *I* increased with (*a*), at least in the region $a > 90°$. On average, *I* was a little less for blows on the radial surface than for those on the tangential surface. In some woods *I* increased with (*c*) in the range below the fibre-saturation point (f.s.p.), while in others it decreased. A parabolic and an exponential equation based on curves for the variation in *I* in relation to (*c*) are compared, and the need for further investigation of the change in *I* in the region of the f.s.p. is indicated.

3701. MCGOWAN, W. M., and YELF, J. T. **Improved device for measuring deformation of wood specimens in compression parallel to the grain.** *For. Prod. J.* 8 (10), 1958 (314–6).

Describes an improved compressometer based on the universal-joint principle, which overcomes the problem of distortion of the specimen under stress. *From authors' summary.*

3702. HEARMON, R. F. S. **The influence of shear and rotatory inertia on the free flexural vibration of wooden beams.** *Repr.* from *British Journal of Applied Physics, London* 9 (Oct.), 1958 (381–8). 23 refs. P.R.

The existence of shear and rotatory inertia effects leads to a reduction in the frequency of flexural vibration of beams as compared with the frequencies predicted by the simple Rayleigh treatment. Tables and graphs, based on the Timoshenko-Goens theory, are given to facilitate the estimation of the correction factor in the case of free-free beams. Experiments are described in which the frequencies of wooden beams (*Sterculia rhinopetala, Picea sitchensis, Fagus sylvatica* and *Fraxinus excelsior*) are measured up to the 16th mode, and a least-squares method is described for analysing the results. Effects introduced by the anisotropic nature of wood are also investigated. *From author's summary.*

3703. KELLOGG, R. M. **Strain behaviour of wood subjected to repetitive stressing in tension parallel to the grain.** *For. Prod. J.* 8 (10), 1958 (301–7). 10 refs.

Presents data on ultimate tensile strength, maximum strain, initial strain, modulus of elasticity and creep, in samples of *Ceiba pentandra, Ocotea rubra* and *Licaria cayennensis* subjected to 100 continuous-stress cycles at stress levels ranging from 30 to 80% of mean ultimate stress levels. Within this range (or for *L. cayennensis* most of it), the creep/initial-stress relationship could be expressed by an exponential equation. Neither ultimate stress nor strain differed significantly between species subjected to 100 cycles and the controls. When creep was related to a given % of ultimate strain, an inverse relationship existed between specific gravity and creep under repeated stressing, but when creep was plotted against fixed initial-stress levels, these differences were markedly reduced.

3704. KING. E. G. **The strain behaviour of wood in tension parallel to the grain.** *For. Prod. J.* 8 (11), 1958 (330–4). 16 refs.

Presents short-term (30-min.) creep tests, with stress levels of 6–86% of ultimate tensile strength, on Basswood, Red Oak, *Cedrela huberi, Ocotea rubra, Dicorynia paraensis, Enterolobium schomburgii* and *Licaria cayennensis* (sp. gr. range 0·4–1·04) [cf. *F.A.* 19 No. 2293]. The creep/stress-level relations are described by means of a linear regression up to the threshold of set and an exponential regression thereafter, but there was some indication that, for a limited range of stress to a point designated threshold of failure, it might better be described by a second linear regression. Permanent set began at about the same initial strain, but the stress level at which set first occurs varied considerably between species.

3705. BORUP, L., and RENNERFELT, E. Vergleichende Untersuchungen über den Ausziehwiderstand von Nägeln in von Pilzen befallenen und in gesunden Kiefernsplintholz. **[Comparative investigations on the withdrawal resistance of nails in decayed and sound Pine sapwood.]** *Holz Roh- u. Werkstoff* 16 (12), 1958 (453–9). [G.g.e.] P.R.

Graphs the results of withdrawal resistance (w.r.) of nails nailed both before and after sample pieces had been (*a*) kept at 20° C. and 60% r.h.; (*b*) kept at temperatures and r.h. that varied but were generally > (*a*); (*c*) submitted to decay by *Coniophora puteana, Lentinus lepideus* and *Poria vaporaria.* In (*a*) w.r. fell to ca. 75% of the original and in (*b*) to ca. 50%, in the first two months. In (*c*) the w.r. decreased as fungal attack increased. When the fungal attack caused loss in weight of ca. 60% of the wood, w.r. was nil. There was no difference in effect between the various fungi.

813. Wood Chemistry

See also Nos. 2748, 2756, 2811, 3676, 3739, 3896–8, 3913.

3706. UGARTE LAISECA, J., *et al.* Laboratorio general de química forestal. Química de la madera. **[General laboratory of forest chemistry. Wood**

chemistry.] *An. Inst. for. Invest. Exp., Madrid* No. 2, 1957 (75–8). [Span.]

Presents results of chemical analyses of wood of *Eucalyptus globulus, Taxus baccata, Alnus glutinosa, Quercus ilex, Castanea sativa, E. rostrata* and *Gleditsia triacanthos.*

3707. PEARL, I. A., *et al.* **Alkaline hydrolysis of representative hardwoods. III.** *Tappi* 42 (1), 1959 (61–7). 14 refs. P.R.

Following previous studies [cf. *F.A.* 20 No. 2319] the 75% *n*-propanol extracts of 46 representative hardwoods were submitted to alkaline hydrolysis with NaOH. As in the alkaline hydrolysis of the woods themselves, all propanol extracts, on alkaline hydrolysis, yielded vanillin, syringaldehyde, vanillic acid, and syringic acid; *p*-hydroxybenzaldehyde, ferulic acid, *p*-hydroxybenzoic acid and *p*-coumaric acid were found individually only in certain woods, and their occurrence, qualitative and quantitative relationships, and relation to other wood components are discussed. Data and results are tabulated.

813.1. Chief Organic Constituents. Constituents of the Cell Wall

See also Nos. 3653, 3665–8.

3708. KRATZL, K., *et al.* Über das Verhalten von markiertem Coniferin in der verholzenden Pflanze. **[The behaviour of labelled coniferin in lignifying plants.]** *Monatshefte für Chemie, Wien* 88 (5), 1957 (721–34). 25 refs. [G.g.] P.O.

Traces the conversion of coniferin applied to cuts in side shoots of Spruce. [Cf. *F.A.* 18 No. 4571.]

3709. FREUDENBERG, K., *et al.* Die an der Verholzung beteiligten Enzyme. Die Dehydrierung des Sinapinalkohols. **[Enzymes contributing to lignification. Dehydration of sinapic alcohol.]** *Chem. Ber.* 91 (3), 1958 (581–90). 20 refs. [G.g.] O.R.S.

Sinapic alcohol was dehydrated to give syngaresinol, using enzymes from the fungi *Psalliota* spp., in which laccase was the most important component.

3710. MCPHERSON, J. A. **The fractionation of Spruce wood.** *Acta chem. scand.* 12 (4), 1958 (779–80). 2 refs. [E.] O.R.S.

Discusses preliminary results of successive extraction of milled Spruce wood with dioxane, dimethyl formamide, dimethyl sulphoxide and water. [Cf. *F.A.* 18 Nos. 4574–5.]

3711. HOLMBERG, B. Fichtenlignine und Thiobenzhydrazid. (Ligninuntersuchungen XXII). **[Spruce lignins and thiobenzhydrazide. (Lignin investigations XXII).]** *Arkiv för Kemi, Stockholm* 13 (3), 1958 (211–6). 5 refs. [G.] O.R.S.

Presents results showing the reaction of ethyl, acetic-acid, alkali and cuproxam lignins with thiobenzhydrazide.

3712. AALTIO, E. **Investigations on the mode of combination of lignin in wood, with special reference to Aspen (*Populus tremula*) wood.** *Annales Academiae Scientiarum Fennicae, Helsinki (Ser. A. II)* No. 88, 1958. pp. 58. 92 refs. [E.e.] L.S.

[A continuation of research reported in *F.A.* 15 No. 4090, based on the same material and technique.] Results of the analysis of wood residues and cooking liquors are interpreted as follows: Aspen wood is partly made up of two homogeneous ligno-uronide complexes of which the first to dissolve belongs to the middle lamellae between the fibres, and the other to their frame walls. Cellulose seems to be in very close association with the latter compound. The carbohydrate portion of the complexes comprises a homogeneous pentosan uronide with a pentosans/uronic-acids ratio by weight of ca. 7/1. The lignin in the readily soluble complex has an OCH_3 content of ca. 20–21%, the other only ca. 15%, the differences arising from a different distribution of the vanillyl and syringyl groupings in the molecules. *From author's summary.*

3713. KÜRSCHNER, K., and HOSTOMKÝ, G. Zur alkoholischen Nitrierung von Hölzern. **[Alcoholic nitration of woods.]** *Holzforschung, Berlin* 12 (5), 1958 (142–8). 7 refs. [G.g.e.] P.R.

Quantitative determination of the lignin obtained in the form of nitrolignin by alcoholic nitration gave values ca. 10% lower than those given in technical literature for Pine, Beech, Oak and Walnut. These lower figures are considered to be the true ones and the higher results to be due to the presence of precipitated carbohydrates firmly held in the lignin.

3714. NAKAO, T. **[Ultramicroscopic structure of [the] cellulose fibre. I & II.]** *Wood Ind., Tokyo* 13 (11; 12), 1958 (6–10; 13–6). 76 refs. [Jap.] P.R.

A review. The bibliography is almost exclusively N. American and European.

3715. GLEGG, R. E., and KERTESZ, Z. I. **Effect of gamma-radiation on cellulose.** *Journal of Polymer Science, Easton, Pa.* 26 (114), 1957 (289–97). 17 refs. [E.e.f.g.] O.R.S.

The materials used, a cotton cellulose and a purified wood cellulose of ca. 99·5% α-cellulose and a mean particle size of 35 μ, were irradiated with γ-rays within the dosage range 60×10^3 to 2300×10^3 R units. The presence of water had no significant effect on the extent of radiation-induced degradation, and in wood cellulose there was little difference between the results from samples containing 3·3, 4·6 and 5·6% moisture. At lower moistures (0·26–0·32%) an after-effect was observed in which the solution viscosities of the irradiated samples progressively decreased for up to 30 days in storage, the duration being independent of the dosage levels studied. The radiation threshold dosage for isolated celluloses appears to be in the range 28·4 to 81·2 $\times 10^3$ R. Cellulose is degraded at γ radiation dosages $\leqslant$ those required for softening plant tissues such as apples, carrots and beets, and it seems probable that its degradation is a major factor in the radiation-induced softening of plant tissues. [Cf. *F.A.* 20 No. 3696.]

3716. TIMELL, T. E. **Isolation of holocellulose from Jack Pine (*Pinus banksiana*).** *Pulp Paper Mag. Can.* 60 (1), 1959 (*T*26–*T*28). 9 refs.

Compares the (*a*) chlorine and (*b*) chlorite procedures for isolating holocellulose; (*a*) caused less removal of carbohydrates and less depolymerization of the cellulose than did (*b*). Both (*a*) and (*b*) gave a severely degraded wood cellulose, in contrast to results from earlier work with Birch [cf. *F.A.* 13 No. 3339].

3717. BOOKER, E., and SCHUERCH, C. **The extraction of pentosans from woody tissues. III.** *Tappi* 41 (11), 1958 (650–4). 3 refs. P.R.

Data are presented showing the amount of pentosan extractable and the rates of extraction from the woody tissues of 21 monocotyledons, dicotyledons and gymnosperms (e.g. *Roystonea regia*, *Quercus alba*, *Ulmus alata*, *Ginkgo biloba*), by varying alkaline concentrations and temperatures below 100° F. Despite differences in pentosan extractability between the 3 categories, certain hardwoods (e.g. Mahogany, and Elm) behaved similarly to monocotyledons. There was little difference in the extraction behaviour of the parenchyma and of the fibrovascular tissue of *Roystonea regia*, showing that extractability was not necessarily dependent on gross fibre structure.

3718. DUTTON, G. G. S., and HUNT, K. **The constitution of the hemicelluloses of Sitka Spruce (*Picea sitchensis*). I. Composition of the hemicellulose and identification of [*a*] 2-*O*-(4-*O*-methyl-*D*-glucopyranosiduronic acid)-*D*-xylose.** *J. Amer. chem. Soc.* 80 (16), 1958 (4420–2). 22 refs. O.R.S.

On hydrolysis the hemicelluloses gave *d*-xylose, *d*-mannose, *d*-galactose, *d*-glucose, (?) *l*-arabinose and an aldobiouronic acid, identified as [*a*] above.

3719. DUTTON, G. G. S., and HUNT, K. **The constitution of the hemicelluloses of Sitka Spruce (*Picea sitchensis*). II. Structure of the mannan portion.** *J. Amer. chem. Soc.* 80 (21), 1958 (5697–701). 20 refs. O.R.S.

3720. HAMILTON, J. K., and PARTLOW, E. V. **The hemicelluloses of Western Red Cedar: the constitution of a glucomannan.** *J. Amer. chem. Soc.* 80 (18), 1958 (4880–5). 37 refs. O.R.S.

3721. HAMILTON, J. K., and KIRCHER, H. W. **The constitution of a glucomannan associated with wood cellulose from Western Hemlock.** *J. Amer. chem. Soc.* 80 (17), 1958 (4703–9). 48 refs. O.R.S.

Results of analyses of the glucomannan, isolated from cellulose produced by the sulphite process, are tabulated, and the results and the function of glucomannans in the living tree are discussed.

3722. HAMILTON, J. K., and THOMPSON, N. S. **Graded acid hydrolysis studies of a xylan polyuronide associated with wood cellulose from Western Hemlock.** *J. Amer. chem. Soc.* 79 (24), 1957 (6464–9). 34 refs. O.R.S.

3723. WHISTLER, R. L., and RICHARDS, G. N. **Uronic acid fragments from Slash Pine (*Pinus elliottii*) and their behaviour in alkaline solution.** *J. Amer. chem. Soc.* 80 (18), 1958 (4888–91). 24 refs. O.R.S.

4-*o*-Methyl-*d*-glucuronic acid was identified as the major acidic component of the hemicellulose fraction, other uronic acids being present only as traces.

3724. ROUDIER, A., and EBERHARD, L. La constitution de six acides aldobiuroniques extraits d'un hydrolysat partiel de bois de pin maritime des Landes (*Pinus pinaster* Soland. subsp. *P. maritima* Fieschi et Gaussen). **[The constitution of six aldobiuronic acids extracted from a partial hydrolysate of wood of *P. pinaster*.]** *C.R. Acad. Sci., Paris* 247 (18), 1958 (1505–7). 7 refs. [F.f.] O.R.S.

3725. LINDBERG, B., and SELLEBY, L. **Birch wood constituents. I. Carbohydrates of low molecular weight.** *Acta chem. scand.* 12 (7), 1958 (1512–5). 3 refs. [E.e.] O.R.S.

Myo-inisitol, fructose, glucose, sucrose, raffinose, stachyose and verbascose were isolated from *Betula verrucosa*. The presence of two higher oligosaccharides, probably belonging to the same series as verbascose, was also indicated.

813.2. Minor Organic Constituents. Extractives. Cell Contents

See also Nos. 3206, 3208, 3860, 3886, 3909, 3945.

3726. NARAYANAMURTI, D. Bedeutung der Holzextraktstoffe. **[The role of extraneous substances in wood.]** *Holz Roh- u. Werkstoff* 15 (9), 1957 (370–80). 41 refs. [G.g.e.] P.R.

Reviews the author's own investigations (including work to be published shortly) and other literature, covering the influence of extractives on swelling, hysteresis, rheology, elasticity, durability, gluing properties,the rheological behaviour of adhesives, the setting of cement [in wood-wool etc.], surface properties of wood, metal corrosion, diffusion of gases and liquids etc.

3727. DIETRICHS, H. H. Importance des constituants des bois pour leur utilisation. **[The importance of the [chemical] constituents of wood for their utilization.]** *Bois For. Trop.* No. 62, 1958 (37–63). 76 refs. [F.f.g.e.span.]

Discusses in detail, with experimental data, the discoloration, corrosion etc., caused by the presence of tannins, during gluing, varnishing etc. of wood; difficulties in gluing, slowing up of drying of varnishes etc. through the presence of phenols; inhibition of setting of wood-cement blocks by sugars and tannins in the wood; dermatitis caused by dust from certain species; and termite-resistance due to chemical constituents.

3728. ISENBERG, I. H., BUCHANAN, M. A., and WISE, L. E. **Extraneous components of American pulpwoods. Part I. The importance of extraneous components. Part II. Identification, properties and constants.** *Paper Industry, Mount Morris, Ill.* 38 (11; 12), 1957 (945–6; 1042–6, 1098). 92 refs. P.O.

[Cf. *F.A.* 8 No. 1998.] Summarizes data from literature of 1946–1956 on extractives and other substances not part of the cell-wall in 32 softwoods and 13 hardwoods.

3729. NISHIDA, K., *et al.* **Pitch troubles, its causes and preventive measures. VI. Comparative investigation into the components of the resin content**

of the sapwood, heartwood, knotwood oleoresin, and pitch of *Pinus densiflora*. *Journal of the Japanese Technical Association of Pulp & Paper Industry, Tokyo* 11 (3), 1957 (33–7). [Jap.?] From *abstr.* in *Chem. Abstr.* 52 (9), 1958 (7690). P.R.

The sapwood resin consists mainly of fatty acids and 33–50% resin acids, heartwood resin of a larger quantity of the latter and a smaller one of the former, and pitch and knotwood resins of ligninsulphonic acids and other substances. Methods of separation of the components are discussed.

3730. SEI, A., and KAMADA, H. **Variation of resin content of standing Red Pine through a year.** *Journal of the Japanese Technical Association of the Pulp & Paper Industry, Tokyo* 10 (12), 1956 (45–8). [Jap.?] From *abstr.* in *Chem. Abstr.* 51 (13), 1957 (9810). P.R.

The moisture content of the standing crops was almost invariable through a year, about 60%, and the resin content varied with the seasons, low in summer and high in winter. The resin content did not correlate with the diameters, heights, or diameter increments of the wood samples.

3731. ZAVARIN, E. **Extractive components from Incense Cedar heartwood (*Libocedrus decurrens* Torrey). VI. On the occurrence of 3-libocedroxy-thymoquinone.** *J. organ. Chem.* 23 (8), 1958 (1198–204). 16 refs. O.R.S.

A new quinoid pigment was isolated and demonstrated to occur *in situ* as well as forming through air oxidation of the other extractives. *From author's summary.*

3732. LO, T.-B., LIN, Y.-T., and LIN, T.-H. **The extractive constituents from the wood of *Libocedrus formosana*. I and II.** *Journal of the Chinese Chemical Society, Taiwan (Ser. 2)* 3, 1956 (30–40). [E.] From *abstr.* in *Chem. Abstr.* 52 (18), 1958 (15446–7). P.R.

3733. MITSUNO, M., and YOSHIZAKI, M. **Flavonoids and a new substance of the catechin series in the heartwood of *Gleditsia japonica*.** *J. pharm. Soc. Japan* 77, 1957 (557). [Jap.?] From *abstr.* in *Chem. Abstr.* 51 (19), 1957 (14705). P.R.

Extraction of the heartwood yielded fisetin, fustin and gleditsin, the last with a structure determined as 3,3′,4′,7-tetrahydroxyflavan.

3734. CHOPIN, J., *et al.* Structure d'un nouveau dérivé flavonique isolé du bois de merisier (*Prunus avium*). **[Structure of a new flavonic derivative isolated from the wood of *P. avium*.]** *Bull. Soc. chim. France* 1957 (2), (192–204). 44 refs. [F.f.] O.R.S.

The name dihydrowogonine is proposed for the substance, a dihydroxy-5,7-methoxy-8-flavanone.

3735. HILLIS, W. E., and CARLE, A. **The polyphenols and shikimic acid of Eucalypt cambium and wood.** *Holzforschung, Berlin* 12 (5), 1958 (136–41). 44 refs. [E.e.g.] P.R.

The main recognizable components in cambium of *Eucalyptus regnans* and *E. sieberiana* were (+)catechin, (−)epicatechin, possibly (−)epigallocatechin gallate, shikimic acid, corilagin, β-glucogallin and three hydrolysable tannins, and in the wood tissue (+)catechin, gallic and ellagic acids and leuco-anthocyanins. Only minor differences were found between the two species. A component similar to iso-eugenol was present in the undifferentiated cambium, but not later; otherwise there was no change in comparative amounts of polyphenols and shikimic acid in the cambium as the growing season progressed. The origin of the polyphenols in woody tissues is discussed.

813.3. Ash Constituents

See also No. 2922.

3736. **Silica content of timber.** *Rep. For. Adm. Malaya 1957*, 1958 (23–4).

The practical significance to be attached to quantitative estimates of Si in timber based on analysis of random samples was investigated. The bole of a tree of White Meranti (*Shorea resinosa*) was used, a large number of timber samples being taken at different distances from the pith and at several heights, and analysed for Si content. There was considerable variation in Si concentration between different samples. It is therefore concluded that a number of analyses must be made on any timber under investigation if the results are to be interpreted quantitatively, and that analysis of random samples may have little significance.

813.5. Reaction with Metals

3737. WRIGHT, T. E., GODARD, H. P., and JENKS, I. H. **The performance of Alcan 65S-T6 aluminium alloy embedded in certain woods under marine conditions.** *Corrosion, Houston* 13 (7), 1957 (77–83). 3 refs. I.C.I.

Laboratory and marine exposure tests were carried out with Mahogany, Canadian Rock Elm, British Columbia Fir, and Gum wood; the effect of protective paints was also studied. Rock Elm was the least, and Mahogany and British Columbia Fir the most corrosive to aluminium. Coating the aluminium with $ZnCrO_4$, anodizing, capping the bolts with wooden dowels, or coating the surface of the assembly, singly or in combination, reduced corrosion. Alcan 65S-T6 showed corrosion resistance much superior to that of Alcan 24S-T3 and 4.

813.6. Effect of Chemicals on Wood. Resistance to Chemical Attack

See Nos. 3697, 3802, 3805.

813.8. Poisonous and Irritant Properties

See No. 3727.

813.9. Wood Chemistry: Miscellaneous

See also No. 3847.

3738. INGRUBER, O. V. **The behaviour of wood and wood constituents as acid-buffering systems.** *Pulp Paper Mag. Can.* 59 (11), 1958 (135–41). 33 refs.

[Cf. Campbell, *F.A.* 3 p. 52.] The literature is reviewed. Using potentiometric titration apparatus, changes in the pH (range 2–12) that occurred in

dilute solutions of strong acids and alkalis on adding suspensions of Spruce, Balsam Fir, or Elm meal etc. are graphed to show the precise pH level of the suspension and the reactive rate and capacity of the system.

814. Natural Durability. Old Wood. Fossilized Wood

See also Nos. 3726–7.

3739. KONDRAT'EV, E. V., and KOSTINA, M. I. Issledovanie himičeskogo sostava drevesin, pogrebennyh v torfjanyh zaležah. **[The chemical composition of wood buried in peat.]** *Ž. prikl. Him.* 31 (6), 1958 (892–7). 13 refs. [Russ.russ.] L.S.

A chemical analysis was made of Pine, Birch and Willow wood 2000–13,000 years old. The degree of decomposition varied from 20 to 60% and is held to be related to the nature of the wood and to the type of peat.

815. Effect of Growth Factors on Structure and Properties

See also Nos. 3125, 3675, 3690, 3695, 3699, 3896.

3740. KÜBLER, H. Studien über Wachstumsspannungen des Holzes. Erste Mitteilung: Die Ursache der Wachstumsspannungen und die Spannungen quer zur Faserrichtung. **[Studies on growth stresses in trees. 1. The cause of growth stresses and stresses across the grain.]** *Holz Roh- u. Werkstoff* 17 (1), 1959 (1–9). 23 refs. [G.g.e.] P.R.

Growing wood develops tension stresses along the grain and compression stresses tangentially to the grain. Tangential compression forces of the young, growing wood cause large tangential and radial tension stresses in the interior of the stem, and these increase with stem diameter, causing, or helping to cause, ring shakes, checks, etc. in the heart of the tree. Cutting logs lengthwise into boards disturbs the state of stress across the grain, causing changes in shape. This stress in the stem was theoretically deduced, assuming a constant tangential compression stress of the young, growing wood, and was checked by extensometer measurements. In general there was good agreement between deductions and actual measurements.

3741. RENDLE, B. J. **A note on juvenile and adult wood.** *News Bull. int. Ass. Wood Anatomists* 1958 (2), (1–6). 20 refs.

A review of the literature, with the suggestion that the terms 'juvenile wood' and 'adult wood' should be defined and included in the next edition of the International Glossary of Terms used in Wood Anatomy.

3742. PECHMANN, H. VON. Die Auswirkung der Wuchsgeschwindigkeit auf die Holzstruktur und die Holzeigenschaften einiger Baumarten. **[The effect of growth rate on the structure and properties of the wood of some tree species.]** *Schweiz. Z. Forstw.* 109 (11), 1958 (615–47). 18 refs. [G.f.]

A discussion, chiefly on the basis of the author's own researches, stem analyses etc., of the effect of growth on such properties as density, strength, structure, homogeneity, etc., including silvicultural measures affecting these, of Spruce, Scots Pine, Japanese Larch, Ash, Oak and Beech, citing an instance where fertilizing slow-growing Pine increased both ring width and the late-wood %, and another, where N fertilizing of Spruce stimulated chiefly the early-wood growth. Finally the effect of heredity on wood structure is illustrated by the comparison of two Poplar clones grown under identical conditions.

3743. PAUL, B. H. **Specific gravity changes in Southern Pines after release.** *Sth. Lumberm.* 197 (2465), 1958 (122–4).

Tests on Longleaf, Shortleaf and Loblolly Pines showed good response in diameter growth, with sometimes an increase, sometimes a decrease and sometimes a fluctuation of specific gravity, presumably depending on whether interacting factors (soil moisture, crown development etc.) promote more early- or more late-wood increment. [Cf. *F.A.* 19 Nos. 421, 975.]

82. Conversion, Shaping, Assembly and Finishing of Wood: General

See also No. 3221.

3744. HORDERN, R. H. [Editor]. **The woodworking machinist. Vols. I & II.** Caxton Publishing Co. Ltd., London. 1958. pp. xv + 327 + 42 plates; pp. x + 306 + [23] + 19 plates. Price £4. 10*s*.

Contains chapters on the various aspects of conversion and the equipment used (saws, planes, moulders, morticers, tenoners, multi-purpose machines and lathes), the treatment of difficult timbers, grinding, lubricating, joints and their construction, machining standard items, mouldings, wood waste, seasoning, supplying timber and joinery items for a house, costing, electricity and power, personnel and management, and Home Office regulations.

3745. **Woodworking industry 1958 directory of machinery and equipment.** *Woodwkg. Ind.* 15 (11), 1958 (605 . . . 643). P.R.

Consists of a classified list giving names of firms (mainly U.K.), but not addresses, an index to trade marks and brand names, and an alphabetical list of manufacturers, with addresses.

3746. PRUŠÁK, J. Dřevoobráběcí nastroje s tvrdým chromem. **[Hard-chromed woodworking tools.]** *Dřevo* 13 (8), 1958 (231–9 + smry. in suppl.). 9 refs. [Cz.g.*g*.] P.R.

Discusses methods of hard-chroming, and the possibilities of hard-chroming tools to be used for working chipboards, fibreboards, etc. Also discusses wear, and self-sharpening in work.

3747. SIMSON, I. I. S"emnye avtopodatčiki. **[Removable automatic feeders.]** *Derev. Prom.* 7 (9), 1958 (9–11). [Russ.] P.R.

Describes and gives the specifications of 3 feed systems (designed by the Leningrad Institute for the Protection of Labour) for circular ripsaws, jointing machines, and spindle moulders.

821. Barking

3748. WURZ, O. Betriebsverfahren mit modernen schwedischen Schälmaschinen. **[Industrial barking with modern Swedish barking machines.]** *Papier, Darmstadt* 11 (23/24), 1957 (548–52). 1 ref. [G.g.e.f.] P.O.

The Cambio barker (various models) [see *F.A.* 17 No. 2860] was satisfactorily used to bark freshly felled Spruce, Birch and Poplar or stored knife-barked timber after steaming for 3–4 hours. The treatment had no adverse effect on pulp quality and caused little waste. Other forest barkers, e.g. the Bark-Lasse [see *F.A.* 16 No. 1816] proved unsuitable for industrial use.

3749. KLEMM, K. H. **Removing the bark from pulpwood. Modern barking methods and bark disposal.** *Paper Tr. J.* 141 (35; 36), 1957 (42–4; 50–5). 22 refs. P.O.

822. Saws and Sawing

See also Nos. 3747, 3793, 3869.

3750. SBURLAN, D. A. Considerații asupra metodelor de debitare a cherestelei de fag. **[Methods of converting Beech logs.]** *Industr. Lemn.* 7 (1), 1958 (1–5). 6 refs. [Rum.russ.g.f.e.]

Points out the unsuitability of frame saws for converting Beech logs, and suggests an improved technique in which 2–4 boards are sawn from the centre of the log at the first passage through the frame saw, and the two large slabs remaining are then put face to face and flat-sawn.

3751. SUZUKI, R. **[Studies on the sawing with fretsaw-blade.]** *Wood Ind., Tokyo* 14 (1), 1959 (17–22). 21 refs. [Jap.e.*e.*] P.R.

Test pieces of *Betula maximowicziana*, *Cercidiphyllum japonicum* and *Chamaecyparis pisifera*, 10 cm. long and 1 cm. thick, were sawn by a fretsaw blade operated at a constant feed force. The influences of (1) radius of sawing curvature, (2) the angle between feed direction and grain direction, (3) feed force, (4) saw width and (5) wood m.c., on sawing resistance, were determined and the results graphed. The relationship of saw speed to the work done and to the roughness of the cut surface was also determined.

3752. THUNELL, B. Über das Einspannen und die Einspannvorrichtungen für Gattersägeblätter. **[Stretching frame-saw blades, and stretching devices.]** *Holz Roh- u. Werkstoff* 17 (1), 1959 (18–23). [G.g.e.] P.R.

The human factor makes it impossible to achieve a uniform degree of stretching for all the blades in a frame saw, and mechanical devices used for stretching show widely varying frictional relationships and thus fluctuations in the degree of blade stretching. Tests on 3 different mechanical stretching devices indicated that the screw type was the best.

3753. REINEKE, L. H., and HVAMB, G. Tørrkløyving med koniske sirkelsagblad. **[Resawing dried wood with a swage saw.]** *Norsk Skogind.* 12 (11), 1958 (459–67). 11 refs. [Nor.nor.e.] P.R.

Sawing of seasoned wood with spring- and swage-set saws was compared. No clear-cut superiority was shown by either type, but variation in board position appeared to affect sawing accuracy more with spring-set saws, and the excess of measured over theoretical kerf to be greater with swage-set saws. Factors affecting accuracy included accumulation of gum and sawdust on the fence-rollers, which increased variations in board thickness by ca. 0·36 mm. Vibration varied with saw speed and saw blade, 19 different blades giving as many patterns of vibration. The use of packing made no major change in the pattern of vibration, but the saw speed at which the least vibration occurred varied with packing method. The mean difference in board accuracy between the most and the least favourable saw speeds (those giving respectively least and most vibration) was 0·54 mm.

3754. VA. Eine neue Plattentrennsäge. **[A new ripsaw for artificial boards.]** *Holz-Zbl.* 85 (11), 1959 (115). [G.]

Describes a circular saw set in a special frame of German manufacture, designed for smaller workshops, shopfitters etc., in which the boards are moved past the saw in a near-vertical position. The saw can be turned from the horizontal to the vertical (for vertical cuts) and moved downward into the work by a hand-operated wheel. Boards up to 5·2 × 2 m. can be sawn.

823. Planing, Cutting of Mouldings. Chiselling, Mortising and Tenoning. Boring. Turning

See also No. 3747.

3755. BRONNER, A. Kritische Drehzahlen von Fräserdornen. **[Critical speeds of moulder spindles.]** *Holz Roh- u. Werkstoff* 16 (12), 1958 (471–6). 4 refs. [G.g.e.] P.R.

With certain necessary simplifications and assumptions, a method of calculating the critical speeds of spindles was developed. Experiments confirmed the accuracy of the method, which can be used for spindles with or without cutters.

3756. GOODCHILD, R. **Power requirements in rotary planing.** Forest Products Research Laboratory, Princes Risborough. 1958. pp. 9 + 6 gphs. P.R.

A report of investigations on the influence of (*a*) feed speed, (*b*) cutting speed, (*c*) depth of cut, (*d*) cutting angle, and (*e*) grain orientation on x (the power requirement in planing various species). The net value for x is not directly proportional to (*a*), the rate of increase in power decreasing slightly as (*a*) is raised. Reduction in (*d*) from 35° to 25° and a change in (*e*) do not affect this trend. As (*d*) is reduced from 30° to 0°, x increases at an increasing rate, this effect becoming more pronounced as (*a*) is increased. The relation between (*c*) and x is linear, and the relation of (*b*) to x also appeared linear, but an increase in the number of knives in work causes a sharp rise in x. The use of speeds < 5000 ft./min. results in deterioration of the surface finish, speeds of 6000–9500 ft./min. being best for high-class work. Jointing the cutters produces a superior finish, provided that the width of heel is not excessive.

3757. LOCKARD, C. R. **Beech for turning [*Fagus grandifolia*].** *Beech Utiliz. Ser. Ntheast. For. Exp. Sta.* No. 18, 1958. pp. 9. 7 refs.

Concludes that it is suitable for small articles such as handles, toys, table legs etc., but less so for delicate or complicated work, as shrinkage, m.c. or the type of lathe used may affect its performance.

824. Forms of Joint. Jointing and Assembly

824.5. Timber Connectors

3758. **Speeds truss building. 'Gang-Nail' connecting plate eliminates hand nailing.** *Sth. Lumberm.* 198 (2467), 1959 (45).

The plate is designed for rigid connexion of joints in roof trusses with help of hydraulic or mechanical presses, through which the parts, assembled on steel or plywood jigs, are passed.

824.7. Glued Joints

3759. JESSOME, A. P. **The efficiency of scarf joints.** *F.P.L. tech. Note For. Prod. Lab. Can.* No. 9, 1958. pp. 17.

Reports findings on different types of scarf joint in glued laminated construction. Factors studied were slope of scarf, modified and unmodified hook scarf joints, and tension || of specimens with and without joints.

824.8. Glues and Gluing

See also Nos. 3727, 3759, 3796, 3935, 3948–9.

3760. CLAD, W. Prüfung von Holzleimen. **[Testing wood glues.]** *Holz Roh- u. Werkstoff* 17 (1), 1959 (23–9). 9 refs. [G.g.e.] P.R.

Describes the '*Keilzapfen*' (wedge-shaped tenon) wooden test-pieces used at the Institut für Holztechnologie und Faserbaustoffe, Dresden, for testing glue-bond strength, and compares the results with those obtained by *DIN* 53253–5 tests.

3761. BRYANT, B. S. **Glue-line evaluation technique for white-speck Douglas-Fir plywood.** *Bull. Coll. For. Univ. Wash.* No. 4, 1958. pp. 14.

An accelerated delamination test proved to be a valid method of evaluating glue lines in such plywood; determining the degree of failure and interpreting the results are easier than with the standard shear test.

3762. BORNSTEIN, L. F. **Chemical foam extension of urea-formaldehyde glues.** *For. Prod. J.* 8 (10), 1958 (51*A*–54*A*).

Describes the process, its development in America, modified glue formulations, bond strength, quantity requirements etc. The use of a foaming catalyst is thought to be preferable to mechanical extension with air. Cheapness (through savings in glue, filler, and labour) is the chief advantage claimed. [Cf. *F.A* 9 Nos. 1693, 1696; 17 No. 2031.]

3763. SUCHSLAND, K. Einfluss der Oberflächenrauhigkeit auf die Festigkeit einer Leimverbindung am Beispiel der Holzverleimung. **[Influence of surface roughness on the strength of glue bonds as exemplified in wood.]** *Holz Roh- u. Werkstoff* 15 (9), 1957 (385–90). 7 refs. [G.g.e.] P.R.

Describes tests with tangential sections of Scots Pine cut by microtome, and gluten glues. Roughness factors, expressed as the area ratio of actual microsurface to its plane projection, ranged from 1·15 for late wood to 1·85 for early wood. In general, shear strength increased with roughness, but in very rough (i.e. large-pored) specimens wood failure developed as the bond became stronger than the wood.

3764. CARRUTHERS, J. F. S., and PAXTON, B. H. **A study of the function of pressure and some associated factors in the gluing of wood.** *Wood* 23 (12), 1958 (503–8). 3 refs.

A close-contact and a gap-filling urea-formaldehyde glue were used at 25° and 95° C. to make 3-ply samples of 0·125-in. peeled veneers of *Khaya ivorensis*, and smoother ones of the same species by sawing the veneer, planing and light sanding. All samples were given the knife test and the results examined statistically. Bonding pressure was found to be critical over the range 25 to 200 lb./sq. in. with both glues when set at 95°, and with the close-contact glue when set at 25°. The function of pressure was not only to bring the two surfaces closer together, thus helping the glue to span the gaps, but also to promote wetting of unspread surface by transfer of the glue from the spread side of the joint. Roughness of surface was unimportant within the limits investigated, but the ability of the glue to wet a particular surface was shown to affect bond quality. When thus completely wetted, the peeled veneer gave better bonds than the planed and sanded material. *From authors' summary.*

3765. CARRUTHERS, J. F. S., and PAXTON, B. H. **Investigation into glues and gluing. Progress report III—Oct., 1958. A study of the function of pressure and some associated factors in the gluing of wood.** Forest Products Research Laboratory, Princes Risborough. 1958. pp. 8 + 4 gphs., 1 photo. 3 refs. Limited distribution. P.R.

3766. MILLER, D. G. **Electrode systems for stray field heating.** *Repr.* from *Canadian Woodworker, Toronto* Aug., 1958. pp. 3. P.R.

Describes investigations made at the Forest Products Laboratory, Ottawa, on the design, efficiency and relative merits of stray-field electrode systems for panel-to-frame gluing.

3767. MANN, J. W. **New electrode designs to spur high frequency gluing.** *Wood, Chicago* 64 (3), 1959 (58). P.R.

Describes a method of reducing arcing in R.F. heating by interposing a layer of relatively high-loss material between the 'live' electrode surfaces and those of the dielectric load, thus producing series capacitance which divides up the electric stress and reduces its intensity by levelling out the field of force. Short and narrow stock is thus usable since linear speeds > 100 ft./min. are normal for stock 4–6 in. wide.

3768. FISCHER, F. Untersuchungen über den Einfluss des pH-Wertes, der dielektrischen Eigenschaften und des Kondensationsgrades von Holzleimen und ihre Bedeutung bei der Verleimung im

Kalt- und Heissverfahren unter besonderer Berücksichtigung der Hochfrequenz-Erwärmung. **[The effect of pH, dielectric properties and degree of condensation of wood glues on cold and hot gluing, with special reference to H.F. heating.]** *Mitt. dtsch. Ges. Holzforsch.* No. 41, 1957. pp. 76 + 1 photo. 59 refs. [G.g.] P.R.

Part I investigates changes of pH values in relation to setting, at various temperatures, of (*a*) urea, (*b*) melamine, (*c*) resorcinol, (*d*) phenolic resins with various hardeners, (*e*) thermoplastic (vinyl) resin and (*f*) casein glues, in the pot and in the glue line. In hot gluing, contact with wood lowered the pH, particularly in (*a*) where Oak had a stronger effect than Beech, Spruce, and Pine. Part II investigates dielectric properties for the frequency 5–50 megacycles/sec. and the resultant heat reactions. Most glues reached considerable bond strengths immediately, and showed an increased strength after 24 hours. Type (*e*), however, failed to reach a considerable strength immediately, but showed a higher strength than any others after 24 hours. Type (*b*) is not considered suitable for HF gluing. Part III investigates the process of condensation of one (*a*)-type resin by measuring changes in viscosity and gelling time, both in storage and after addition of hardeners. At constant temperatures (100° C.) and pressure (12 kg./cm.), bond strength of Beech veneer reached a maximum at 35,000 centipoises when pressing time was short (thrice the gel time) and between 8000 and 18,000 cp. where pressing time was 13 min. Experimental methods and testing apparatus are described.

3769. CARRUTHERS, J. F. S., and PAXTON, B. H. **Ageing of glue joints set by R.F. heating.** *Timb. Technol.* 66 (2234), 1958 (585, 587–8). 4 refs.

The effect of age on the strength of glues set (*a*) at room temperature and (*b*) under R.F. heating was tested by measuring the force needed to separate the laminae in laminated Beech blocks after 0, ½, 1, 2, 3, 5, and 7½ years' storage in a constant-temperature room (25° C.; 60% r.h.). The glues used were urea, phenol, and resorcinol-formaldehyde types and one animal glue. The full test results (tabulated) show that no real difference exists between the rate at which (*a*) and (*b*) decline in strength. Generally the glues first increased in strength for 6–18 months, and then declined in strength at rates of 8–30 lb./year.

3770. GRAHAM, P. H. **Improving quality of cores produced by electronic gluing.** *Veneers & Plyw.* 52 (12), 1958 (10–1, 33). P.R.

Lays emphasis, *inter alia*, on regular daily maintenance, the special training of operators, accurate matching of power requirements to the size and/or weight of wood and the number and weight of glue lines, and proper machining of joints on the core stock before gluing, a poorly machined edge precluding a good glue joint. Details are presented of electrode sizes in current use, a minimum thickness of ⅛ in. being generally recommended to avoid possible contact between glue squeeze-out and the wooden backing used to mount the electrode strips.

3771. BOYE, C. Forsøg med limning af imprægneret træ. **[Gluing impregnated wood.]** *Træindustrien* 8 (12), 1958 (163–7). [Dan.dan.e.] P.R.

Beech and Scots Pine impregnated with Celcure, creosote or (Beech only) the Boliden salt K33, were glued with phenol-resin glue and subjected to shear and delamination tests. Satisfactory glue bonds were obtained for both untreated blocks, and those treated with Celcure (both species), K33 (Beech) or creosote (Pine only). Beech treated with creosote gave unsatisfactory results. Treated and untreated Beech glued with resorcinol resin gave results contradicting previous experience, and further tests will be made.

3772. SEIFERT, K. Das Verleimen harzreicher Hölzer. **[Gluing wood rich in resin.]** *Holzindustrie, Berlin* 11 (6), 1958 (186–9). [G.] P.O.

Presents the results of tests of strength of glue joints in Beech, Pine, and solid wood and veneers of Gurjun [*Dipterocarpus* spp.], for a variety of glues and gluing methods.

825. Cleaving. Adzing. Mechanical Comminution

See No. 3781.

826. Peeling. Slicing. Trimming, Edging etc. of Thin Sheets

3773. FEIHL, A. O. **Reducing heat distortion in veneer lathes.** *Timb. Technol.* 66 (2234), 1958 (604–6).

[Cf. *F.A.* 20 No. 1081.] Describes investigations at Ottawa on the form and measurement of thermal expansion and consequent distortion in the knife and pressure-bar assemblies of veneer lathes. Two methods of reducing distortion were tried and found successful. One was to pre-heat the lathe carriage with electrical heating elements to 130° F., thus reducing the temperature differences in the carriage during peeling. This method, however, is undesirable from the operator's point of view. A better method is to fit cooling elements that circulate water at 70° F., so as to cool the knife and pressure bar. By their use distortion was reduced on a standard 52-in.-wide lathe, from $\frac{5}{1000}$ to $< \frac{1}{1000}$ in.

3774. KNIGHT, R. A. G., and NEWALL, R. J. **Effect of load and heat on veneer lathes.** *Timb. Technol.* 67 (2236), 1959 (58–60).

The deflections of knife and pressure-bar were measured: (*a*) in a cold lathe peeling a cold log of *Berlinia* sp., to obtain deflections due to forces alone; (*b*) in an initially cold lathe peeling a log of *Chrysophyllum albidum* preheated to 85° C., to study the interaction of (*a*) and the warming-up process; (*c*) peeling a hot log of *Berlinia* sp. immediately after (*b*). When cutting started, there was a considerable 'kick-back' of knife and pressure-bar, but after a few revolutions much of this was recovered. In peeling a hot log, the knife and bar both moved upwards and towards the log, but by dissimilar amounts. The net effect was to reduce the vertical distance between the two parts by an amount that could nullify the intended action of the bar, and to increase the horizontal distance between the parts, so that slack peeling could result.

3775. BURGESS, H. J., and KUMARASAMY, K. **Veneer-peeling research in Malaya.** *Malay. Forester* 21 (4), 1958 (251–60). 5 refs.

This condensation of a report prepared for a meeting of the Asia Pacific Forestry Commission (FAO) at Bandung in June 1957, describes the method used in Malaya to test the peeling qualities of different timbers and to determine appropriate lathe settings. The effects of variations in knife angle and horizontal pressure-bar gap are examined at the same time and on the same log while the log radius is reduced by only an inch; thus log radius need not be taken into account as a third independent variable. A method by Kivimaa has been adopted, of setting the pressure-bar gap so that over-compressed veneer is produced at one end of the log while that at the other end is not compressed at all. Kivimaa's method of assessing the severity of lathe checks by testing the veneer in tension at right angles to the grain has also been adopted. The best value for the pressure-bar gap is independent of the knife angle throughout the practical range of knife-angle values. *From authors' summary.*

3776. **[Peeling of veneer from White Meranti (*Shorea bracteolata*).]** *Rep. For. Adm. Malaya 1957*, 1958 (21).

Experiments have shown that a pressure-bar gap of ca. 43% of nominal veneer thickness gives the greatest freedom from lathe checks in $\frac{1}{16}$-in. veneer of this species. This is the true gap, measured after the carriage has been deflected when the knife engages the log. The optimum pressure-bar setting is found to be, for all practical purposes, the same for all values of the knife angle. Two experiments were made to determine the effect on veneer strength of peeling with a micro-ground knife when the pressure-bar is set in the ordinary way for peeling with a plain knife. As expected, micro-grinding led to an appreciable change in the veneer quality for any particular pressure-bar setting.

827. Bending. Moulding (other than by Cutting)

See also Nos. 3808–9.

3777. **The steam bending properties of various timbers.** *Leafl. For. Prod. Res., Lond.* No. 45 (rev.) 1958. pp. 9.

Presents two tables, one showing the radius of curvature at which breakages during bending should not exceed 5% for some 130 species, the other classifying the species by their bending properties as very good, good, moderate, poor and very poor. Many new species and species re-tested as more material becomes available are included.

828. General Carpentry and Joinery

3778. EASTWICK-FIELD, J., and STILLMAN, J. **The design and practice of joinery.** Architectural Press Ltd., London. 1958. pp. 222. 42 refs. Price 42*s*. P.R.

Covers: notes on the joinery industry; the timber yard; movement in timber; analysis of construction (various types of joint); the design and machining of sections and joints; plywood, boards and veneers; transparent finishes; specification and practice; and a joinery specification checklist. Appendixes deal with: a selection of timbers suitable for joinery; an extract from B.S. 1186, Part 1, 1952 (Quality of Timber and Workmanship in Joinery: Quality of Timber); B.S. Specifications and Codes of Practice applicable to joinery; and traditional joinery components.

829.1. Finishing

See also Nos. 3727, 3888–9.

3779. BURGER, J. H. **A comparison of methods of evaluating exterior natural finishes.** *For. Prod. J.* 8 (10), 1958 (282–7).

Of various methods—weight change, gloss, surface roughness, wetting-angle of a water droplet, and tri-stimulus colour difference—tested on 18 finishes (clear, stain, or both) applied to panels of *Shorea negrosensis* and *S. polysperma* subjected to artificial weathering, none was satisfactory in supplying quantitative data corresponding to visual ratings, but the method of absolute colour differences was best.

83. Timber Manufacturing Industries and Products. Uses of Wood as Such

See also No. 3228.

831. Fuelwood and Various Types of Rough Timber

See also Nos. 3185, 3680, 3695, 3803–4, 3812, 3837–8, 3842.

3780. Wohin mit unserem Brennholz? **[How can we use our fuelwood?]** *Wald u. Holz* 40 (5), 1959 (128–34). [G.]

Description of a modern, highly automated, central-heating system for a group of school buildings in Switzerland, combining oil burners and specially constructed wood-burning furnaces. In this way the forest-owning local authority concerned has an economic outlet for varying quantities of hardwoods otherwise difficult to sell.

3781. BEIJBOM, L. Fliseldningen: skogsmomentet; eldningsmomentet. **[Chip-burning—operations in the forest; operations relating to burning.]** *Skogen* 46 (2; 3), 1959 (27–30; 50–3). [Sw.]

The section dealing with forest operations discusses the merits and calculates the costs of (1) chipping of whole trees, hauled to the chipping site after spring felling and seasoning during summer with crowns intact; (2) chipping of whole trees hauled to the site without a seasoning period; (3) chipping of roughly trimmed, unseasoned trees; (4) chipping either roughly trimmed trees after a period of seasoning with crowns intact or strip-barked long logs. Methods (1) and (4) are recommended for summer and winter respectively. Method (2) gives green chips with low fuel value and further drying of the chips is called for with methods (2) and (3). A shed for storing and further air-drying of the chips is described. Loading the chips into lorries for further transport, either loose direct from the chipper, or in containers, capacity ca. 5 cu.m., either of cloth or of fine-meshed netting, is discussed. The section on chip burning discusses problems of storage, costs in comparison with other fuels, calorific value, stoves, furnaces etc.

3782. Proefaankap van mierenhout-mijnstukken. **[Trial felling of Mierenhout [*Triplaris surinamensis*] for mine timber.]** *Jversl. Landsbosbeh., Paramaribo* 1957 (78–86 + 4 photos). [Du.]

Describes the operations (felling, with tools used, stacking, transport and loading on to the cargo boats) by which 4500 stacked cu.m. were supplied to a firm in Essen for use as mine timber. For the purposes of the trial none of the timber was treated before it left Surinam, and it was found on arrival to be damaged by an unknown heartwood borer, possibly in the living tree, by *Chlorida festiva* on the surface of the wood, and by other borers e.g. *Xylopsocus capucinus* and *Tetrapriocera longicornis*. Treatment with an insecticide immediately after felling is recommended for future consignments. Service tests in mines in the Ruhr for some 3–4 months show that the props are equal to those of softwoods but that the splits are far more liable to break than those of softwood and that the timber is unsuited for this use.

3783. BURGESS, H. J. **Progress report on the uses of timber for electric power-line poles in Malaya.** [*Docum.*] *4th Sess. FAO Asia-Pacif. For. Comm., Bandung 1957* No. *FAO/APFC*-57/29, 1957. pp. 10 + 3 tbls., 1 dgm., 3 gphs. 9 refs. Limited distribution.

The reasons are given for Malaya's developing interest in timber power-line poles. A pole of spaced-column construction has been designed in which the long members are held apart by spacing blocks of solid wood. The pole is held clear of the ground by short renewable posts. After a field test on a typical pole, laboratory tests were made to determine the best size and spacing of the blocks. A method has been developed for designing such poles from the results of tests on small clear specimens of the timber used. Tests were also made on composite cross-arms, and further tests are in progress to examine the improvement gained by using timber connectors. Design calculations have been made for the poles and for the bolted connections by which the cross-arms and conductors will be mounted. The durability of timber in Malaya is discussed and recommendations are made for treatment with preservatives. The report considers the possibility of using round poles instead of square-sawn ones. It concludes with a statement of the present position and indicates likely developments in the future. *Author's summary.*

3784. **Study on wood sleepers in the Asia-Pacific region, by Food and Agriculture Organization of the United Nations.** [*Docum.*] *4th Sess. FAO Asia-Pacif. For. Comm., Bandung 1957* No. *FAO/APFC*-57/2 (rev.) 1957. pp. 107. 19 refs. Limited distribution.

Includes general information on tracks and sleepers, technical and supply aspects of wooden sleepers, failure of wooden sleepers, specifications and standardization.

3785. SOLOV'EV, V. E. **Not 12 years, but 25.** *Put' i put. Hozjajstvo* No. 12, 1957 (38). [Russ.] From *abstr.* in *Prev. Deterior. Abstr.* 16 (1), 1958 (*Wood* 3–4). P.R.

Coating of pure 'Kuzbass' varnish [unspecified] and mixtures of it with fine sand or slaked lime were used to waterproof railway sleepers exposed under normal working conditions for 2–5 years. Cracks 1–2·5 mm. wide occurred on 3 of the 7 pure-varnish-treated sleepers, while little or no change was observed for the sleepers coated with the varnish mixture. Mean crack width on untreated sleepers was 3·3 mm. These waterproofing methods are claimed to increase the service life of sleepers from 12 to 20–25 years.

832. Mills, Their Functions and Products

3786. La protection contre l'incendie dans les industries du bois. **[Fire protection in the wood industries.]** *Cah. Centre tech. Bois* No. 32, 1958. pp. 31. [F.] P.R.

Covers the causes of fire, general and particular risks in the various branches of the industry, methods of prevention and control, and the organization of fire fighting, dealing finally with the various aspects of fire insurance and the nature of the buildings and industry concerned.

3787. **Fire risks in the timber trade.** *Timb. Tr. J.* 228 (4296), 1959 (90). 2 refs.

Notes indicating the minimum precautionary measures to be taken to keep fire damage in timber-yards at a minimum.

3788. WALMARI, Z. **Fire damage and its causes in the [Finnish] woodworking industry in 1946–1956.** *Finn. Pap. Timb.* 9 (8), 1958 (107–10). [E.]

Examines statistics compiled by the insurance companies on the number of fires, compensation paid, and causes.

832.1. Sawmills and Planing Mills

See also Nos. 3565, 3635, 3744 *et seq.*, 3869.

3789. TURNBULL, R. F. **Sawmilling abroad and in Australia.** *Aust. Timb. J.* 24 (10), 1958 (25 . . . 43, 109–10).

Outlines, from personal knowledge, the practices of Scandinavia, Britain, France, Germany, N. America, S. Africa, New Zealand and Australia, and draws from them detailed advice for the Australian sawmiller, particularly for raising the very low production per man on the mill floor.

3790. WILLIAMS, W. C. **Prince George [British Columbia].** *Lumberm.* 85 (12), 1958 (36–45).

A general account of the milling activity in the district, which has 700 mills, cutting 600 million bd. ft. annually from standing reserves of ca. 200,000 million. Flow patterns in 5 small mills (3 gang, one double and one single circular headrig) and a modern high-production planing mill are described and illustrated.

3791. HYLER, J. E. **Modern sawmilling. Parts 108–13.** *Sth. Lumberm* 198 (2466–2471), 1959 (43 . . . 52; 33 . . . 38; 39 . . . 50; 35 . . . 44; 35 . . . 42; 35 . . . 39).

Timber sizers, safety devices, laminating of beams, sorting and handling of lumber.

3792. DIAMANTSTEIN, M. Experimentarea spălării buştenilor prin stropire (jet) cu apă caldă de la condensator. **[Experiments in washing logs with a jet of hot water from a condenser.]** *Industr. Lemn.* 7 (2), 1958 (41–6). [Rum.russ.g.f.e.]

The effect of such washing, in a sawmill where the logs, skidded long distances over earth roads, were often coated with mud, was to increase frame-saw production by 13–27%, reduce power consumption by 40% and blade consumption by 70%, and to save grinding stones.

3793. PFEIFFER, J. R. **Log-gang and scrag mills' sawing efficiency.** *Inform. Circ. Ore. For. Prod. Res. Cent.* No. 11, 1958. pp. 20.

A study was made of the sawing of small logs (e.g. thinnings), (1) in 'scrag' mills, furnished with circular saws and edgers, and (2) in 'log-gang' mills with different types of frame saw. Productivity ranged from 3000 to > 6000 bd. ft./man-day. Scrag mills with double pairs of saws had the highest rates of the 6 mills studied.

832.2. Veneer and Plywood Mills, including the Manufacture of Composite-Wood Assemblies

See also Nos. 3681, 3759–76, 3791, 3809, 3811, 3924.

3794. MAY, R. H. **Development of the veneer and plywood industry in California.** *For. Surv. Release Calif. For. Range Exp. Sta.* No. 34, 1958. pp. 26. 5 refs.

Outlines the history of the industry from 1908, and presents data on plywood and veneer production, mostly for 1944–57. A short bibliography is given of U.S. publications on veneer and plywood statistics from 1908 to 1957.

3795. Maderas desenrollables de Guinea Española. **[Veneer timbers of Spanish Guinea.]** Servicio de la Madera, Ministerios de Industria y Agricultura, Madrid. 1957. pp. 71 + 3 gphs., 13 plates. [Span.]

A study in three parts. Part 1 is mainly statistical and deals with the production of veneer timbers in Spanish Guinea, giving figures for exports and imports into Spain over the years 1949–55 inclusive. Prices and standards used in classifications are included. Part 2 is a list of species, with commercial names, of veneer timbers from Spanish Guinea. In Part 3 the physical and mechanical properties of 16 species are listed, with illustrations.

3796. SHEN, K.-C. **The effects of dryer temperature, sapwood and heartwood, and time elapsing between drying and gluing on the gluing properties of Engelmann Spruce veneer.** *Abstr. of thesis*, in *For. Chron.* 34 (3), 1958 (335).

It was found that drying temperature and storage time had no important effect on glue-bond quality. Sapwood veneer gave a lower breaking-load but a higher % wood failure than heartwood. The breaking-load seemed to be a more reliable indicator of glue-bond quality than % wood failure.

3797. CALLIA, V. WALTER. A madeira laminada e colada de pinho de Paraná nas estruturas. **[Glued laminated Paraná Pine timber in building constructions.]** *Bol. Inst. Pesqu. tec. S. Paulo* No. 47, 1958. pp. 58. 33 refs. [Port.port.]

Describes methods used in the construction of glued laminated arches of Paraná Pine and gives the results of tests on such arches. Using the methods recommended, glued laminated members of Paraná Pine can be constructed, having a bending strength of 170 kg./sq. cm.

833. Timber in Buildings and Engineering Structures (Manufacture and Use)

3798. Puurakenteiden normit (PN). **[Standard specification for wooden structures.]** *Rakennusinsinööriyhdistyksen Julkaisuja, Helsinki* No. 31*A*, 1958. pp. 64. [Fi.] P.R.

833.1. Building Components and Fittings: General

See also Nos. 3744, 3778, 3797, 3834–6.

3799. QUIQUANDON, B. Essais de charpentes en vraie grandeur sur le banc du C.T.B. **[Full-scale structural testing at the Centre Technique du Bois.]** *Rev. Bois Appl.* 14 (1), 1959 (51–4). [F.]

A review of the testing equipment installed in 1957 and the tests carried out to date.

3800. Das Holz im modernen Betonbau. **[The use of wood in modern concrete construction.]** *Int. Holzmarkt* 1959 (2), (11–3). [G.]

Discusses the use of specially made boards [see *F.A.* 20 No. 1112] as formwork, and compares the effect of these boards and of ordinary wooden formwork on the properties of the concrete.

833.2. Special Uses in Residential, Commercial and Public Buildings

3801. SMEYERS, F. Habitations rurales en bois. **[Rural dwelling houses made of wood.]** *Bull. agric. Congo Belge* 49 (6), 1958 (1437–66). [F.du.]

Describes, with photographs, plans and indications of cost, 5 types of house designed for erection in villages of the Belgian Congo, with detailed account of methods of construction.

833.3. Special Uses in Factories and Workplaces

3802. BEHRENS, J. **Cooling tower maintenance study.** *Research Project, California Redwood Association, San Francisco* No. 5.31320 (*Interim Report N*), 1958. pp. 7. P.R.

A combination of a Cl content of > 1 p.p.m. with a pH of > 7·5 in the circulating water, caused surface and internal wood deterioration. When non-oxidizing algaecides or no algaecide were used, mild to moderate surface, and no internal, deterioration occurred.

833.4. Special Uses in Agricultural Structures

3803. **Timber farm buildings and improvements—Series No. 1. A range of designs that will enable you to take advantage of the farm improvements scheme.** Timber Development Association Ltd., London. 1958. pp. 6 + [3]. P.R.

Presents designs of Dutch barns, lean-to's, implement sheds, covered stockyards, deep litter houses, silage clamps, silage pits, grain silos, potato

stores, roofs for general-purpose and storage buildings, and bridges, together with a list of U.K. firms who manufacture and erect to TDA design.

3804. **Timber farm buildings. Series 2.** *Suppl.* to *Farmer's Weekly, London* Aug. 8, 1958. pp. 15. P.R.

Contains the drawings and list mentioned in Series 1 [see preceding abstract], together with drawings for a cowhouse, a self-erect pole barn for silage, and fencing and gates.

833.8. Wood in Hydraulic, River and Marine Uses

See No. 3839.

834. Shingles. Cooperage. Packing Containers. (Manufacture and Use.)

3805. **Reference and data handbook: Wood tanks.** National Wood Tank Institute, Chicago. [*n.d.*] pp. 27. 7 refs. P.R.

Contains sections on the uses of wood tanks (e.g. in breweries, petroleum refining, food and liquid storage, etc.); a table on the capacity of cylindrical tanks based on inside diameter; the physical properties of wood as related to its use in tanks; the chemical constituents of wood in relation to the service life of tanks; possible tank linings; design data; installation and care of tanks; and foundations for tanks.

3806. NÁJERA ANGULO, F., *et al.* Sección de maderas: características y aplicaciones. Estudio de las modificaciones de que es susceptible el actual envase para la exportación de la naranja por vía marítima con el fin de conseguir la mayor economía posible de madera, al mismo tiempo que se aumenta su resistencia mecánica. [**Wood section: properties and uses. Modifications to the present type of crate used in the export of oranges by sea with the object of economizing in wood, while increasing the strength of the crate.**] *An. Inst. for. Invest. Exp., Madrid* No. 2, 1957 (111–21 + 2 plates). [Span.]

3807. Envases para naranja y mandarina. [**Orange and mandarin crates.**] *Hoja divulg. Serv. Madera, Madrid* No. 7, 1958. pp. [2]. [Span.]

Presents specifications for a standard crate (30 kg.) and two further approved designs (15 kg.) for oranges and mandarin oranges respectively.

835. Industrial and Domestic (Utility) Woodware. Toys and Models. Sports and Recreational Goods. Musical, Scientific and Mathematical Instruments. Surgical Applications etc.

See also No. 3757.

3808. GORBENKO, A. F. Primenenie vtulok iz pressovannoj drevesiny. [**The use of bushes made from pressed [end-grain-bent] wood.**] *Lesn. Hoz.* 11 (6), 1958 (58–9). [Russ.]

Describes fully the processes in end-grain bending of wood [cf. *F.A.* 20 No. 1085] to make bushes and bearings, and also describes and illustrates some of the clamps, moulds and vices used for the bending process.

3809. VINIK, P. A. Avtomatičeskaja linija dlja izgotovlenija vtulok i vkladyšej podšipnikov iz DSP. [**An automatic line for producing bush and sleeve bearings from laminated wood.**] *Derev. Prom.* 7 (9), 1958 (5–6). [Russ.] P.R.

Describes the production line designed for the Perm Plywood Combine, which has a planned output of 250,000 bushes p.a. (mean wt. of the bushes is 1 kg.) with 2-shift working. Only two workers are needed, apart from a fitter.

3810. SOULILLOU, A. Histoire de quilles. [**The story of skittles.**] *Rev. Bois Appl.* 13 (12), 1958 (59–61). [F.]

Discusses briefly the history of the game. In France the timber used to make skittles is Hornbeam, and *Dipteryx odorata* from Central America is used for the woods (balls). The properties making these timbers suitable, the various stages of manufacture, and some of the 42 designs of skittle in use in France are described.

838. Vehicles (including Ships, Boats, Aircraft)

3811. **Laminated pressure-treated wood used in prototype minehunter.** *Bureau of Ships Journal, [U.S. Navy Department]* No. 6, 1958 (2–5). From *abstr.* in *Prev. Deterior. Abstr.* 16 (1), 1958 (*Wood* 2–3). P.R.

In the minesweeper described, the structural members of the hull were of laminated Red Oak treated with Tanalith to a retention of 0·75 lb./cu. ft. of dry salt under a pressure of 150 lb./sq. in., complete preservative penetration of the sapwood and $< 80\%$ penetration of the heartwood being a prerequisite. The impregnated wood was conditioned by kiln drying below 150° F., laminated at 10–15% m.c., and cured for 10 hr. at 150–170° before slow cooling. Apart from its greater durability than the traditional White Oak, especially under conditions conducive to fungus decay, impregnated Red Oak laminates offer a new source of supply for naval ship building.

839.8. Industrial Waste Wood, its Processing and Uses

See also Nos. 3744, 3780–1, 3927.

3812. LILLESUND, F. Moderne fyring med trebrensel. [**Modern firing systems for wood fuel.**] *Norsk Skogind.* 12 (12), 1958 (493–502). [Nor.e.] P.R.

Compares the calorific value and equivalent price of a number of wood materials (e.g. sawmill waste, Birch chips, Pine, Spruce and Birch fuelwood) with those of oil, and describes with illustrations a variety of furnaces, stoves etc. using wood, with examples of their use in Norwegian plants.

3813. GRANLUND, P. Undersøkelser over metoder for tørking av rå sagflis. [**Studies on methods of drying sawdust.**] *Norsk Skogind.* 12 (1), 1958 (411 . . . 418). [Nor.nor.e.] P.R.

The three methods, steam-drum drying, flue-gas drum drying or suspension (flash) drying, all gave good results, but initial cost of drum driers was comparatively high. Recommendations for the design of suspension driers are made.

3814. MCKENZIE, W. M. **Project U.16. Waste prevention and utilization of wood waste. Sub-project**

U.16–1. Sawdust utilization. Progress Report No. 6. An investigation into the treatment of wood waste for use as a soil improver. (Third report). The effect of sawdust on germination and seedling development of commercial vegetables. Division of Forest Products, C.S.I.R.O., S. Melbourne. 1958. pp. 12 + 2 sets of photos. 9 refs.

Fresh sawdust of *Pinus radiata* and *Eucalyptus regnans* reduced germination and seedling growth of most common vegetables, but solvent-extracted sawdust did not have this effect.

3815. WILDE, S. A. **Marketable sawdust composts, their preparation and fertilizing value.** *For. Prod. J.* 8 (11), 1958 (323–6 + 1 photo, 1 dgm.). 11 refs.

Describes methods of composting sawdust, particularly an improved process in which the sawdust is first treated with anhydrous NH_3 with the help of a mechanically operated conveyor of the grain-auger type, pressure-sprayed with H_3PO_3 and K_2SO_3 and inoculated with *Coprinus ephemerus* [cf. *F.A.* 17 Nos. 923–4]. Favourable tests with the compost on maize and radishes are reported, and its capacity for counteracting the ill effects on the soil of substances used for the control of fungi, weeds and insects in nurseries is stressed.

3816. MCKENZIE, W. M. **The effect on nitrogen availability of adding fragmented wood to the soil.** *Repr.* from *Aust. J. agric. Res.* 9 (5), 1958 (664–79). 22 refs.

Changes in the nitrate content of incubated sawdust/soil mixtures were investigated in order to study the effects of (1) wood species, (2) extraction of the sawdust, (3) addition of $CaCO_3$, and (4) the form of N added in nutrient solutions, and the time trend of N uptake and release. The most important factor was (1). For *Eucalyptus regnans*, *E. sideroxylon*, and *Pinus radiata* the maximum amounts of N taken up averaged respectively 1·6, 1·4 and 1% of the oven-dry wood present. The amounts may be inversely related to the degree of lignification of the wood. Maximum uptake was reached in a period varying from 5 weeks (*E. regnans*) to 11 weeks (other species). The addition of $CaCO_3$ accelerated the rate of N uptake and gave the maximum values reached. When a N salt only was supplied there was evidence of deficiency of some other element. The other factors investigated had little or no effect on N uptake. N was released very slowly, which indicated that under temperate conditions in the field, rate of relase would be too slow to be useful for many crops. Mainly Ascomycetes and Fungi Imperfecti, but no Basidiomycetes, were observed in the samples. *From author's summary.*

84. Preservation and Other Treatments to Improve the Properties of Wood. Damage by Biological Agencies and its Control. Seasoning. Timberyard Practice

841. Wood Preservation

See also Nos. 3771, 3783, 3811, 3843–5, 3850–1.

3817. **Standard specifications for wood preservatives with a creosote basis.** *S. Afr. Bur. Stand. Specif.* No. 590/4, 1957. pp. 32. [E.Afrik.] P.R.

The five wood preservative mixtures dealt with contained respectively (1) high-temperature creosote and mineral oil, (2) creosote and mineral oil, (3) high-temperature creosote and coal tar, (4) low- and medium-temperature creosote and coal tar, and (5) high- plus low-, and high-temperature creosote.

3818. HUDSON, M. S. **Colorimetric determination of creosote in old poles.** *For. Prod. J.* 8 (11), 1958 (340–4). 3 refs.

Describes tests in which extracts made from ground-up sample cores of Southern Pine transmission poles were rated against a set of standard extracts of known creosote content. Comparison with semi-microchemical determination indicated that such a set of standards had only a limited value (i.e. only for one type of creosote, one locality, etc.) but within a given set of circumstances it could be expected to be accurate to ca. 1 lb. creosote per cu. ft.

3819. MALLISON, H., GROENOU, H. VAN, and PILGGVRÖTHER, E. Studien über die Extraktion von Teeröl aus imprägnierten Hölzern. **[Studies on the extraction of creosote from impregnated wood.]** *Bitumen, Teere, Asphalte, Peche und verwandte Stoffe, Heidelberg* 7, 1956 (141–5). 16 refs. [G.] P.O.

Pine and Beech, freshly impregnated or after a service life of 25 or 20 years respectively since impregnation, were treated with various extractants. These, the methods used, and changes in the chemical properties of the creosote are discussed.

3820. SWEENEY, T. R., *et al.* **Coal tar creosote studies. Part I. A method for the accelerated evaluation of marine wood preservatives.** *Corrosion, Houston* 14 (6), 1958 (53–9). 17 refs. I.C.I.

Involves the use of small panels having a high surface/volume ratio, and their leaching in fresh running water at 80° C. before exposure to attack.

3821. RICHARDS, A. P. **Preservative treatments for marine piles.** *Bureau of Docks Technical Digest, U.S. Navy Department* No. 73, Dec. 1956/Jan. 1957 (17–9). From *abstr.* in *Prev. Deterior. Abstr.* 16 (1), 1958 (*Wood* 1). P.R.

In a marine-borer exposure test of 8 years' duration, Pine panels treated with various distillates were exposed at two locations of high *Limnoria tripunctata* activity. The preservatives included: (1) 3 straight-run oils with varying amount of residue, distilling above 355° C.; (2) the same oils with a reduced content of tar acids and/or naphthalene; (3) an imported vertical-retort tar creosote; (4) an imported coke-oven tar creosote; (5) a mixture of (3) and (4); (6) a coal-tar/creosote mixture; and (7) a coal-tar/petroleum mixture. The tests indicated that the efficiency of coal-tar oils against borers depended more on the amount used and its even distribution than on its composition, but the addition of pure coal tar to creosote not only increases resistance to leaching but may also change the impregnated wood surface mechanically, making it less susceptible to borer penetration.

3822. Lektorskij, D. N., and Babočkin, P. N. Primenenie gazogeneratornoj smoly dlja konservirovanija drevesiny. [**The use of gas-generator wood tar for wood preservation.**] *Gidrol. lesohim. Prom.* 11 (5), 1958 (14–5). 3 refs. [Russ.] P.R.

Laboratory experiments showed that soaking wood samples in a 6% concentration of wood tar gave control of *Coniophora cerebella*, *Polyporus squamosus* and *Lenzites sepiaria*. The authors suggest its use as a preservative either pure or after treating with lime or organic solvents.

3823. Gersonde, M. Beeinträchtigung eines Randschutzes von Bauholz durch Regen. [**The impairment of surface-treated building timber by rain.**] *Holz Roh- u. Werkstoff* 17 (1), 1959 (10–8). 15 refs. [G.g.e.] P.R.

Water-soluble salts—(*a*) silico-fluoride, (*b*) bi-fluoride, (*c*) U-salts, and (*d*) a fire-proofing salt—were painted on to Pine and Spruce structural timber. After the lapse of (1) 2 days, (2) 4 weeks, softened tapwater was applied for 20 min. daily for 5 days by sprinklers, to simulate light rain, and the amount of leaching then determined. After only 5 min. of rain, the surface layer of the treated wood was leached if the water could run off, but the fluorides did not diffuse from the deeper layers to the surface even after 5 days of 20-min. daily rain. Leaching for (1) was: for (*a*) and (*d*) 50–70, (*b*) 20–40, and (*c*) 20–30%; for (2), it was ca. half these values. Taking into account evaporation losses, the average preservative retention after (1) was (*d*) 10, (*a*) 22, (*b*) 30 and (*c*) 40% of the amount applied, and after (2) ca. 25, 45, 38 and 50% respectively.

3824. Rosel, A. ***Lyctus* beetle investigation Project P 15; Sub-Project P. 15–8. The toxicity of various preservatives to *Lyctus*. Progress Report No. 1. Tests on the toxicity of Tanalith U, Boliden BIS, arsenic pentoxide, boric acid and zinc sulphide to *Lyctus*.** Forest Products Laboratory, C.S.I.R.O., Melbourne. 1958. pp. 16. P.R.

Test specimens of *Argyrodendron trifoliatum*, *Flindersia pubescens* and *Cinnamomum laubatii* were inoculated with laboratory-bred *Lyctus* beetles and treated with 4 preservatives falling within the required pH range of 2·90–3·50; H_3BO_3 was used as control. The killing point of the preservatives was shown to be considerably influenced by the nutritional content of the wood and the proposed toxic retentions were therefore based on the results obtained with the most susceptible species, viz. *A. trifoliatum*.

3825. Gay, F. J., Harrow, K. M., and Wetherly, A. H. **Laboratory studies of termite resistance. III. A comparative study of the anti-termitic value of boric acid, zinc chloride, and 'Tanalith U'.** *Div. Ent. tech. Pap. Commonw. sci. industr. Res. Organ. Aust.* No. 4, 1958. pp. 14. P.R.

H_3BO_3 (at a loading of > 1·09%), $ZnCl_2$ (> 1·8%) and 'Tanalith U' (> 0·90%) all protected *Podocarpus spicatus* and *Pinus radiata* against *Nasutitermes exitiosus*, *Coptotermes lacteus* and *C. acinaciformis*; all the loading values required are much above those found necessary in New Zealand to give protection against attack by *Anobium punctatum* (0·043, 0·18 and 0·06% respectively). *C. acinaciformis* had a much higher tolerance than *C. lacteus* to Tanalith U, and the two *Coptotermes* spp. were much more susceptible than *N. exitiosus* to H_3BO_3.

3826. Rudman, P. **Project P.00/47. Methods of analysis for boric acid. Progress report No. 1. Two methods for analysing boric acid in Australian timbers.** Division of Forest Products, C.S.I.R.O., Melbourne. 1958. pp. 15. 4 refs. Limited distribution. P.R.

Two methods, one volumetric, the other spectrophotometric, were compared, on Australian timbers treated with H_3BO_3, to give known final loadings. The spectrophotometric method proved sufficiently sensitive and the more accurate.

3827. Simon, A., and Rabowsky, H. Quantitative und qualitative Bestimmung von Imprägniersalzen im Holz. [**Quantitative and qualitative determination of preservative salts in wood.**] *Chemische Technik, Berlin* 9 (10), 1957 (600–1). [G.] L.S.

Describes reactions for tri-valent Cr in the presence of chromates, and for tri- and penta-valent As, and a method of quantitative determination of Cr, As and F from the same sample, after hydrolysis with NaOH and Na_2O_2.

3828. Gent, P. K. van. **Analysis of treated timber [for preservative retention]: a comparison of analytical and calculated results obtained from *Pinus patula*, treated respectively with an oil- and water-soluble preservative.** *South African Industrial Chemist, Johannesburg* 12 (4), 1958 (71–4). 13 refs. P.O.

Fifteen sapwood samples were treated with a solution containing 2% PCP and 3% Zn naphthenate in paraffin (*a*), and 15 with a solution of 0·3 lb. Tanalith C per gal. water (*b*). Mean retention values by weight per cu. ft. of timber, obtained by analysis of the treated timber, were for (*a*) 20% but for (*b*) only 2% below the calculated values. This suggests that timber analysis may be a valid method of determining preservative retention for at least some preservatives.

3829. Schulze, B. Untersuchungen über das Eindringvermögen öliger und wässriger Hausbock-Bekämpfungsmittel beim Vorhandensein von Bohrgängen im Holz. [**The penetration capacity of oily and aqueous preparations for the control of *Hylotrupes bajulus* when tunnels are present.**] *Holz Roh- u. Werkstoff* 14 (6), 1956 (210–8). 13 refs. [G.g.] P.R.

In glass tubes filled with frass, the aqueous preparation tested (*a*), Osmol WB_4 with an HF basis, was about equal in capillary rise to the best of the oily preparations tested (*b*) [cf. *F.A.* 16 No. 2385]. In tests using artificial tunnels in Pine sapwood, tunnels || to the surface (the most frequently encountered condition) had no effect on depth of penetration. Vertical tunnels finishing 1–5 mm. below the surface increased penetration of (*b*) but not of (*a*), which, however, had greater general penetration. Vertical open holes (as in timber from which the outer layers have been removed) were penetrated by (*a*) and (*b*) to about the same depths,

but whereas (*a*) spread into the wood round the holes, (*b*) did not. Observations from practical treatments confirmed these test results.

3830. KÖRTING, A. Über die vorbeugende Wirkung von Holzschutzmitteln gegen den Hausbockkäfer in der Praxis. [**The preventive effect of wood preservatives against *Hylotrupes bajulus* under practical conditions.**] *Holz Roh- u. Werkstoff* 16 (10), 1958 (377–83). 16 refs. [G.g.e.] P.R.

Examinations of 34 roof trusses treated 2–8 years previously with various chemical preparations to destroy *H. bajulus* or to prevent its attack, revealed no attack by larvae of the beetle since the treatment. Though in many cases the amount of preservative demanded by German Standard DIN 68 800 was not retained, live tests showed that a certain protective effect remained. Tests with wood that had been treated with preservatives 4½ years earlier showed that bifluoride salts gave a quicker kill than oily preservatives. *From author's summary.*

3831. MCNIGHT, T. S., and MERRALL, E. **Fungistatic effectiveness and leachability of copper abietate and formate preservatives.** *For. Prod. J.* 8 (9), 1958 (256–7). 12 refs.

Soil-block tests on Red Pine sapwood with graded concentrations of these preservatives indicated that Cu abietate (in a Varsol solvent) was resistant to leaching by water, and retentions of ⩾ 0·136 lb. Cu/cu. ft. reduced weight loss from *Poria monticola* to ca. 11·9% of controls. Cu formate (an aqueous solution) could only be fixed in the wood by steaming and gave little protection against *P. monticola.*

3832. HOF, T., and LUIJTEN, J. G. A. **Organotin compounds as wood preservatives.** *Timb. Technol.* 67 (2236), 1959 (83–4). 3 refs.

Describes agar and wood-block tests of the effectiveness of (*a*) triethyl tin hydroxide, (*b*) triethyl tin acetate, (*c*) tributyl tin oxide, and (*d*) tributyl tin acetate solutions as preservatives against 5 common brown-rot fungi and 1 white-rot fungus. Toxic limits are tabulated. These organo-tin compounds are colourless, show considerable resistance to leaching, and exhibit a high degree of activity against the fungi. Only (*a*) is reasonably water-soluble, but it penetrates the outer layers of wood easily, and the possibility of combining it with existing formulations containing Cu salts appears attractive.

3833. BAECHLER, R. H. **Microbiological process report. Newer preservative treatments for wood.** *Applied Microbiology, Baltimore* 4 (5), 1956 (229–32). L.S.

Includes a description of the double diffusion technique for fence posts and cooling towers [cf. *F.A.* 19 Nos. 2426, 4913] and mentions promising research into non-toxic modifications of the cell-wall by e.g. acetylation or cyano-ethylation.

3834. BAVENDAMM, W., and ANCZYKOWSKI, H. Beiträge zur Holzschutztechnik. Zweite Mitteilung. Praxisnahe Untersuchungen über die Imprägnierung von Bauholz durch Kurztauchen und Trogtränkung. [**Wood protection techniques. 2nd report. Investigations, in conditions similar to practice, on the preservation of building timber by dipping and cold soaking.**] *Holz Roh- u. Werkstoff* 14 (6), 1956 (218–22). 1 ref. [G.g.] P.R.

The timbers, and the 2 oily and 3 of the 5 salt preparations tested by soaking, were the same as those used in an earlier test series [cf. *F.A.* 16 No. 2340]. In the dipping tests with 15 or 20% HF salts, retention decreased but penetration increased with moisture content (testing range 13–90%), maximum retentions after 30 min. being 62 g./sq. m. surface for Pine and 28 g. for Spruce. Soaking proved superior to brushing in retention and penetration after ca. 8 hours, but for the retentions commonly specified ⩾ 24 hours were needed for Pine and ⩾ 48 for Spruce. Penetration of salts, after 48 hours was 5–15 mm. in Pine sapwood, 3–5 in Pine heartwood, and 2–5 in Spruce, and that of oils 14–15 mm., ⩽ 1 mm., and ⩽ 1 mm. respectively. No modern highly soluble salts were tested.

3835. BAVENDAMM, W., and SCZESNY, W. Beiträge zur Holzschutztechnik. Dritte Mitteilung. Praxisnahe Untersuchungen über die Imprägnierung von Bauholz durch die Heiss-Kalt-Trogtränkung. [**Wood protection techniques. 3rd report. Investigations, in conditions similar to practice, on the preservation of building timber by the hot-and-cold bath treatment.**] *Holz Roh- u. Werkstoff* 15 (9), 1957 (381–4). 11 refs. [G.g.e.] P.R.

[Cf. preceding abstract.] Two methods, (1) cooling in the same bath, and (2) transfer from a hot into a cold bath, 3 temperatures (40, 60 and 80° C.) and 3 treating times (4, 6 and 8 hr.) were compared. In general, penetration and retention increased with temperature and time, though not linearly. (1), though not uniformly better, was simpler and adequate. Treating times were much less than in cold soaking, satisfactory retention being obtainable at 40° in 4–8 hr. At higher temperatures, oil penetration in Pine heartwood and Spruce was much improved, a point of great practical significance. In this test series, Spruce was easier to impregnate than Pine, owing, it is thought, to the Pine being of narrow-ringed Swedish growth instead of German, and thus not strictly comparable.

3836. BAVENDAMM, W., and SIUTS, U. Beiträge zur Holzschutztechnik—Fünfte Mitteilung: Praxisnahe Untersuchungen über die Imprägnierung von Bauholz durch Bohrlochdrucktränkung. [**Wood preservation techniques. 5. Investigations, in conditions similar to practice, on the preservation of building timber [*in situ*] by pressure impregnation via drilled holes.**] *Holz Roh- u. Werkstoff* 16 (11), 1958 (430–5). 17 refs. [G.g.e.] P.R.

Gives results of the absorption and penetration of 4 water-soluble and 2 oily preservatives applied under pressure via holes drilled in air-dry and wet, squared and round, specimens of Pine and Spruce wood. Cold oils, because of their low viscosity, were unsuitable for use with this method, and a bifluoride preparation gave the best results among the water-soluble preservatives. Results were better with Pine than with Spruce. In general, drilling holes 50 cm. apart in Spruce and 100 cm. in Pine is

recommended. This pressure treatment shows several advantages over simple impregnation via drilled holes [cf. *F.A.* 20 No. 2473].

3837. STRUHÁR, J. Výsledky poloprevádzky hlbokej impregnácie stĺpov. **[Results of trials on the deep impregnation of poles.]** *Dřevo* 13 (8), 1958 (243–5 + smry. in suppl.). 1 ref. [Slovak.g.*g.*] P.R.

In continued experiments [cf. *F.A.* 18 No. 4678] unbarked Spruce and Fir poles from (*a*) summer and (*b*) winter fellings were sprayed with water. Algae formed on the surfaces of the poles, but did not impair quality, and had a toxic effect on fungi. The poles were impregnated as before, at moisture contents of 25–30%, and the Rueping process again proved superior to the Bethell. Penetration depth (Rueping) with (*a*) averaged 1·3 cm. (extremes 0·7–2·2 cm.), and with (*b*) 1·7 cm. (0·6–3·8 cm.). Uptake was ca. 85 kg./cu.m. This 'wet treatment' of poles increases penetration depth 3- or 4-fold, but the method requires large storage areas and greater reserves of poles.

3838. GÖHRE, K. Einfluss der Schälart auf die Tränkbarheit von Grubenholz. **[The influence of barking method on impregnation of mine timber.]** *Holzindustrie, Berlin* 10 (9), 1957 (290–3, 302). 2 refs. [G.g.] P.O.

In experiments with 3% salt (UA or U) solutions, by (*a*) pressure or (*b*) open-tank treatment, impregnation of fully-barked Pine timber was quite satisfactory, that of strip-barked wood (removing 12 strips of even breadth, representing ¼ of the bark surface), very uneven, and that of unbarked wood inadequate. The differences between barking methods were less for (*b*) than for (*a*), and the impregnation of fully-barked wood was less satisfactory with (*b*).

3839. **Roof those reservoirs now.** *Wood Pres. News* 36 (11), 1958 (6–8). 3 refs. P.R.

Pressure-creosoted roofs for water reservoirs in California reduced evaporation and contamination [cf. Lindsley, *F.A.* 2 p. 230] and were claimed to have a life expectancy of at least 45 years. Their possible use as a means of reducing the hazard of contamination from radio-active fall-out is also mentioned. Some constructional details are given of a new (1958) roof design involving the use of glued-laminated (Glulam) girders and plywood sheathing pressure-treated with Chemonite.

3840. BENITO MARTÍNEZ, J., *et al.* Sección de micología forestal, patología y conservación de maderas. Ensayos abreviados de duración de la madera con estacas clavadas en el suelo, en coordinación con 'The State Institute for Technical Research, Helsinki'. **[Section for forest mycology, pathology and wood preservation. Short-term trials of the durability of wood, using stakes driven into the soil, carried out in conjunction with the State Institute for Technical Research, Helsinki.]** *An. Inst. for. Invest. Exp., Madrid* No. 2, 1957 (189–95 + 2 plates). [Span.]

Describes the design of these graveyard tests of treated and untreated wood of Pines and Spruce, which started in 1956. Some preliminary observations (for 1957 and 1958) are presented.

842. Treatments to Improve the Resistance of Wood to Physical and Chemical Agencies other than Fire

3841. STAMM, A. J. **Dimensional stabilization of wood by thermal reactions and formaldehyde cross-linking.** *Tappi* 42 (1), 1959 (39–44). 15 refs. P.R.

Research was carried out on samples of Sitka Spruce, Douglas Fir and Redwood to assess the dimensional stabilization imparted to the wood by a heat stabilization treatment, alone or together with a formaldehyde cross-linking reaction. In the former, the thermal reaction is increased by the use of a catalyst, e.g. wood containing 2·5% of $ZnCl_2$ catalyst develops dimensional stability from the thermal reaction about 17 times as fast as catalyst-free wood. The formaldehyde cross-linking reaction occurs only in the presence of an acidic catalyst and heat. Reductions of as much as 90% in swelling were attained with as little as 7% of bound formaldehyde, but the reaction greatly reduces the toughness and abrasion resistance of the wood. The principle of dimensional stabilization by cross-linking reactions appears to be sound and economical when the molecular weight of the cross-linking agent is low, and cross-linking reactions obtained with other agents of low molecular weight may have less detrimental effect upon the strength properties of wood.

843. Fireproofing and Fire Resistance

3842. **Coatings on timber.** *Rep. Safety in Mines, Lond. 1957*, 1958 (27).

Tests have been made of the fire resistance conferred on timber boards by Na silicate coatings [cf. *F.A.* 16 No. 1110]. The results have confirmed the value of a firmly adhering layer in considerably reducing the ease of ignition by intense radiation. If the coating or the timber is damp, escaping steam will raise blisters in the coating but will not detach it if it has been made of the correct grade of silicate.

844.1. Sap-staining and Mould Fungi

3843. LOHWAG, K. Verkürzte Testungsmethode von bläuewidrigen Holzschutzmitteln. **[A shortened method of testing anti-sapstain preservatives.]** *Holzforsch. u. Holzverwert., Wien* 9 (1), 1957 (13). 3 refs. [G.] P.R.

[Cf. *F.A.* 13 No. 4335.] Suggests a shortened method, taking fresh, naturally stained samples 10 × 5 × 0·9 cm. and brushing the chemical over a zone 3·5 cm. wide in the centre of the sample, delineated with a saw kerf. The samples are kept in a saturated atmosphere, on wet filter paper in a Petri dish, and after 3 weeks the treated zone is examined for the presence or absence of mycelia and fruiting bodies.

3844. Memleket şartlarına göre kayın'ın ardaklanmasını önleme imkanları üzerinde araştırmalar. **[Research on preventing stain in Beech logs.]** *Orm. Araşt. Enst. Yıl Bült.* No. 4, 1956 (34, 38–9, 53–4). [Turk.e.*e.*]

Tests were begun in 1954 and ended in Dec. 1955. Results, shown in a graph, include the following: (1) stain on logs stored in the forest started later and

progressed more slowly than on those stored at the depot; (2) stain was not found in logs barked in the forest and sawn in the depot during the test; (3) creosote delayed staining for 2 months in the forest and one month in the depot; (4) September and October were the most favourable months for the progress of stain in the forest in the Düzce district; (5) white discoloration started in August at the depot, and October in the forest. Fruiting bodies of many wood-rotting species were found on the logs.

3845. **Control of fungal infection on Wattle wood.** *Rep. Wattle Res. Inst. S. Afr. 1957/58*, 1958 (27).

Spraying newly felled and stripped Wattle trees with a 5% solution of PCP showed promise as a protection against stain and mould fungi which greatly diminish their value as pulpwood.

844.2. Wood-destroying Fungi

See also Nos. 2831, 3331 *et seq.*, 3705, 3831–2, 3844, 3907.

3846. COWLING, E. B. **A review of literature on the enzymatic degradation of cellulose and wood.** *Rep. U.S. For. Prod. Lab., Madison* No. 2116, 1958. pp. 26. 84 refs. P.R.

Reviews mainly American and European literature on: the nature of enzymes and their action; methods of studying enzymes; structure and properties of cellulosic materials in relation to their susceptibility to enzymatic degradation; cotton and wood cellulose; the mechanism of enzymatic digestion of cellulose by fungi; and the enzymatic degradation of whole wood.

3847. MANGENOT, F. Acidité ionique et populations fongiques des bois. II. Influences des conditions de culture sur la croissance et la synthèse des acides humiques. [**Acidity and fungus populations in wood. II. Influence of conditions of culture on growth and on the synthesis of humic acids.**] *Rev. gén. Bot.* 64 (766), 1957 (670–7). 9 refs. [F.f.] O.B.D. [Cf. *F.A.* 16 No. 1119.]

3848. WESTHUIZEN, G. C. A. VAN DER. **Studies of wood-rotting fungi: I. Cultural characteristics of some common species [in S. Africa].** *Bothalia* 7 (1), 1958 (83–107). 20 refs.

Descriptions, with key, of *Amauroderma rude*, *Coniophora arida*, *Ganoderma colossum*, *Lentinus sapor-caju*, *Lenzites palisoti*, *Polyporus arcularius*, *P. sanguineus*, *P. hirsutus*, *Poria vaillantii*, *Schizophyllum commune*, *Stereum hirsutum*, *S. purpureum*, *S. sanguinolentum*, *Trametes cingulata*, *T. meyenii* and *T. proteus*.

3849. GOKSØYR, J. **Studies on the metabolism of *Merulius lacrymans* (Jacq.) Fr. I. Carbohydrate consumption, respiration and acid production in surface cultures.** *Physiol. Plant., Copenhagen* 11 (4), 1958 (855–65). 3 refs. [E.e.]

Two strains of *M. lacrymans* were grown as surface cultures on a liquid medium of carbohydrate (glucose, xylose or cellobiose), peptone, KH_2PO_4, $MgSO_4$ and thiamine. Measurements were taken weekly during the 10-week growth period. The two strains behaved very similarly. Growth was best with pure xylose as carbohydrate, which had an 'economic coefficient' of 0·55 mg. mycelium/mg. xylose. The respiratory quotient was low at the start of the growth period but increased considerably by the end, while the respiratory intensity was high initially, gradually decreasing. Acid production during the first week of growth was so high as to account for all O_2 consumed, indicating that the dominating respiratory process was the formation of oxalic acid, so that CO_2 must have been formed mainly from a concurrent fermentative process. Later, acid production accounted for only a fraction of the O_2 consumption and a gradual shift to normal aerobic respiration is indicated; a concurrent increase of the respiratory quotient shows that fermentation occurs at this stage.

3850. GERSONDE, M. Untersuchungen über die Giftempfindlichkeit verschiedener Stämme von Pilzarten der Gattungen *Coniophora*, *Poria*, *Merulius* und *Lentinus*. III. *Merulius lacrymans* (Wulf.) Fr. und *Merulius silvester* Falck. [**The susceptibility to poisons of different strains of fungi of the genera *Coniophora*, *Poria*, *Merulius* and *Lentinus*. III. *M. lacrymans* and *M. sylvester*.**] *Holzforschung, Berlin* 12 (6), 1958 (167–75). 42 refs. [G.g.e.] P.R.

[Cf. *F.A.* 20 No. 2500.] Four cultures of (*a*) *M. lacrymans* and two of (*b*) *M. silvester* were compared. Cultures of (*a*) showed differences in their ability to decay wood, but the (*b*) cultures behaved alike. The cultures were most susceptible to F compounds and to $HgCl_2$, rather less to Na arsenate and PCP, and were most resistant to α-chloronaphthalene and creosote.

3851. SCHULZ, G. Vergleichende Untersuchungen mit verschiedenen Stämmen von *Lentinus lepideus*, gleichzeitig ein Beitrag zum Soil-Block-Verfahren. [**Comparative investigations with different isolates of *L. lepideus*, a contribution to the soil-block method.**] *Holz Roh- u. Werkstoff* 16 (11), 1958 (435–44). 6 refs. [G.g.e.] P.R.

The American soil-block method and the German 'Klötzchen' method (DIN 52176) were used to test 25 different isolates of *L. lepideus* for their wood-destroying capacity and their sensitivity to preservatives. There were great differences in the behaviour of the isolates, both to untreated and to treated wood. High wood-destroying capacity does not in itself indicate high resistance to preservatives. Most of the isolates were suitable for investigations of natural decay resistance and for preservative tests under laboratory conditions. On the basis of mycelial growth, certain 'types' with differing destructive capacity could be distinguished.

3852. LOHWAG, K. Über die Abbauintensität des *Polyporus betulinus* (Bull.) Fr. [**The decaying power of *P. betulinus*.**] *Sydowia, Annales Mycologici Ser. II, Horn, Beiheft* No. 1, 1957 (183–6). 7 refs. [G.g.f.] I.M.I.

In tests with wood blocks exposed to the action of *Polyporus betulinus* for 4 months, the following values for loss of weight in % were obtained: *Acer platanoides* 10%, *Betula pendula* 33%, *Carpinus betulus* 30%, *Fagus sylvatica* 17%, *Populus alba*

18%, *Quercus sessiliflora* (heartwood) 0·4%, *Abies alba* 22%, *Picea abies* 11%, *Pinus sylvestris* (sapwood) 13%, (heartwood) 1·5%.

3853. KENNEDY, R. W. **Strength retention in wood decayed to small weight losses.** *For. Prod. J.* 8 (10), 1958 (308–14). 12 refs.

A study in which 12 species, varying widely in origin, density and durability, were tested after controlled decay by (*a*) *Polyporus versicolor* as a representative white rot, and (*b*) *Poria monticola* as a brown rot. Strength loss, as measured by the modulus of rupture in static bending and work to maximum load, was less for (*a*) than for (*b*) for the same % weight loss, and while differences between species for (*a*) were small, they were considerable for (*b*). Teak, for instance, lost 27% in work to maximum load when the weight loss was 1%, while for *Larix occidentalis* both strength values were 5% less at the same weight loss. The strength/weight-loss ratio was greatest for *Calophyllum brasiliense*. *Licaria cayennensis* suffered neither weight nor strength loss during the 6 months' testing period. In many species, considerable strength losses were found before weight losses could be observed. When samples of *L. occidentalis*, *Quercus alba*, *Tilia americana*, *Tectona grandis* and *C. brasiliense*, all exposed to the fungus for equal periods, were tested for carbohydrate hydrolysis in 1% NaOH, the % loss in modulus of rupture was proportional to the increase in solubility compared with that of intact controls. Hot-water solubility was greatest in the Larch and least in *C. brasiliense*, suggesting that woods with large reserves of simple carbohydrate suffered relatively little reduction in strength. It is suggested that an alkali-solubility test would give better indications of deterioration than weight tests. [Cf. *F.A.* 16 No. 1121.]

3854. ROELOFSEN, P. A. Eine mögliche Erklärung der typischen Korrosionsfiguren der Holzfasern bei Moderfäule. **[An explanation of the typical corrosion pattern in wood fibres with soft rot.]** *Holz Roh- u. Werkstoff* 14 (6), 1956 (208–10). 10 refs. [G.] P.R.

Discusses previous explanations of the phenomenon of 'diamond patterns' of mycelial growth, caused by the formation of short cavities in the secondary cell-wall with cone-shaped, pointed ends, and advances the author's own theory. This assumes that the fibrils form a kind of ultra-microscopic lattice presenting preferential pathways to the cellulase secreted by the hyphae. In a postscript, Frey-Wyssling criticizes the theory and restates his own, which also postulates a lattice, but assumes that this is to be found at the 'amicrocospic' (crystalline) level.

3855. TRAUTVETTER, R. **'Mykoholz', a material with new properties.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 4036, 1958. pp. 6 + 6 photos. Transl. by E. Pichler from *Holzindustrie, Berlin* 9 (9), 1956 (238–41). [See *F.A.* 18 No. 4703.] Limited distribution.

845.1. Marine Borers

See Nos. 3820–1.

845.2. Terrestrial Borers

See also Nos. 2732, 3394, 3479–83, 3491 *et seq.*, 3782, 3824, 3829–30.

3856. BRIMBLECOMBE, A. R. **Destructive wood borers and their damage.** *Pamphlet, Division of Plant Industry, Queensland Department of Agriculture and Stock, Brisbane* No. 165, [1956]. pp. 43. I.I.E.

Describes the most important species of wood-boring insects in Queensland, their damage, and the host trees and timbers likely to be attacked. General notes are given on the life histories of wood-borers.

3857. HICKIN, N. E. **Some involuntary immigrants. A series of unusual wood-boring beetles.** *Timb. Technol.* 67 (2235), 1959 (33).

Illustrates and describes briefly two wood-boring beetles (*Eburia quadrigeminata*, and *Pyrridium sanguineum*) which reach U.K. timberyards as larvae in imported timber, and subsequently develop to the adult stage.

3858. HICKIN, N. E. **Some involuntary immigrants. A series of unusual wood-boring beetles.** *Timb. Technol.* 67 (2236), 1959 (81).

Illustrates and briefly describes *Plagionotus arcuatus* and *Chrysobothris chrysostigma*, which occasionally reach the U.K. as larvae in wood imported from Europe.

3859. HEURN, F. C. VAN, and WIEL, P. VAN DER. *Helops rossii* Germ., een houtbeschadigende kever, nieuw voor de Nederlandse fauna. **[*H. rossii*, a wood-destroying beetle new to the Dutch fauna.]** *Entomologische Berichten, Amsterdam* 17 (10), 1957 (211–3). 1 ref. [Du.e.] I.I.E.

Reports the finding for the first time in Holland of *H. rossii*, a species from S. Europe. Though the beetles were found in a piece of stranded Pine driftwood, it is considered probable that they were already at home in Holland, and did not come ashore in the wood.

3860. VIADO, G. B., and YLAGAN, M. M. **Starch, total sugar and moisture contents of *Bambusa vulgaris* Schrad. in relation to infestation by *Dinoderus minutus* Fabr.** *Philippine Agriculturist, Laguna* 41 (4), 1957 (215–22). 7 refs. L.S.

No marked difference in starch and sugar contents was found between 1- and 2-year culms, the top part of both containing more starch and less total sugar than the basal parts, and reaching their maximum starch content in March, the driest month. Both sets of culms had a higher moisture content in the basal part, and younger culms a higher m.c. than older ones. There was no correlation between m.c. and rainfall. The younger culms were more susceptible to *D. minutus* than the older ones, but no correlation was found between susceptibility to attack and the starch, total sugar, or moisture contents. The greater infestation in the lower part of the culm may be caused by the presence of a greater amount of wood or tissue, capable of supporting more beetles than the upper part.

3861. WEIDNER, H. Die Entstehung der Hausinsekten. **[The origin of insects in the house.]**

Z. angew. Ent. 42 (4), 1958 (429–47). 51 refs. [G.g.e.] O.H.

An ecological speculation, discussing *inter alia* *Hylotrupes bajulus* and *Anobium punctatum*. It is thought that the factors now confining them almost exclusively to houses (though 'wild' occurrences of *H. bajulus* are mentioned), such as completion of larval development entirely inside dry wood, need not necessarily be the result of adaptive mutations.

3862. DÜRR, H. J. R. **The morphology and bionomics of the European houseborer, *Hylotrupes bajulus* (Coleoptera: Cerambycidae).** *Entomology Memoirs, Department of Agriculture, Pretoria* 4 (1), 1957. pp. 136. 7 pp. of refs. Price 12*s*. P.R.

3863. WHITE, M. G. **Occurrence of the house longhorn beetle, *Hylotrupes bajulus* L. (Col. Cerambycidae) in Jersey, C.I.** *Ent. mon. Mag.* 94 (1134), 1959 (244).

Beetles were found emerging from floorboards made of *Pinus pinaster* imported from France. Other finds were later made in a door jamb in St. Helier, in 7-year-old roof timbers, and in a tomato-picking box, also made of imported Maritime Pine.

3864. RASMUSSEN, S. **On the response of *Hylotrupes* larvae to doses of cholesterol and other sterols.** *Oikos* 9 (2), 1958 (211–20). 7 refs. [E.e.]

Analyses their growth response in laboratory conditions to different doses of cholesterol in order to determine maximum and minimum effective doses, and makes a comparison with the growth-promoting effects of sitosterol and ergosterol.

3865. SCHMIDT, H. Wie 'bohrt' die Hausbocklarve. **[The 'boring' of the larva of *Hylotrupes bajulus*.]** *Holz-Zbl.* 84 (138), 1958 (1767). 6 refs. [G.]

A description of the mouth parts and of the actual process of gnawing and chewing as observed under the microscope.

845.3. Termites

See also Nos. 2728, 3825.

3866. VAYSSIÈRE, P. Les termites en Malaisie. **[Termites in Malaysia.]** *J. Agric. trop. Bot. appl.* 4 (11), 1957 (473–80 + 2 plates). 9 refs. [F.] P.O.

Lists and describes species attacking trees, houses and furniture, and discusses control methods in house construction and insecticides.

3867. HARRIS, W. V., and BROWN, E. S. **The termites of the Solomon Islands.** *Bull. ent. Res.* 49 (4), 1958 (737–50 + 8 photos). 16 refs.

Lists 12 species (Kalotermitidae 2, Rhinotermitidae 6, Termitidae 4) with an illustrated key to their soldier castes, a general indication of relative abundance, and notes on distribution, habitats, nests, and infestation of Coconut palms and houses. Damage to buildings (chiefly by *Cryptotermes domesticus* (a dry-wood species) and *Coptotermes grandiceps* and *C. pamuae*) should be combated by impregnation of timber for the dry-wood species and efficient construction for the others.

3868. EBELING, W., and PENCE, R. J. **Termite control: prevention and control of the western subterranean termite [*Reticulitermes hesperus*].** *Circ. Calif. agric. Exp. Sta.* No. 469, 1958. pp. 16.

846. Steaming

3869. DUMITRESCU, M. Influenţa aburirii cherestelei de fag asupra succesiunii operaţiilor de debitare şi prelucrare în ferăstraiele circulare. **[The Effect of steaming Beech lumber on the succession of operations in initial conversion and re-sawing with a circular saw.]** *Industr. Lemn.* 7 (1), 1958 (5–8). [Rum.russ.g.f.e.]

Experiments were made in re-sawing Beech with a circular saw after initial conversion in a frame saw: (1) re-sawing followed by steaming and air seasoning; (2) steaming followed by re-sawing and air seasoning; (3) steaming and air seasoning before re-sawing. Method (1) proved the most efficient and economical.

847. Drying (Seasoning)

See also Nos. 3078, 3680, 3744, 3796, 3813.

3870. NOBUKUNI, M. **[Influence of rainfall on the air seasoning of cross ties and logs.]** *Wood Ind., Tokyo* 13 (12), 1958 (17–9). 2 refs. [Jap.jap.e.] P.R.

Tabulates data on rainwater absorption by, and subsequent natural air drying of, Buna [*Fagus crenata*] and Nara [*Quercus* sp.] sleepers, and Sugi [*Cryptomeria japonica*] logs.

3871. PFEIFFER, J. R. **Forced-air drying pays dividends.** *For. Prod. J.* 8 (11), 1958 (22*A*–26*A*).

Summarizes data on drying, with 60-in. propeller fans, 9 charges of West Coast Hemlock, Douglas Fir and Western Red Cedar, stacked out-of-doors in Oregon, for periods of ca. 2 to ca. 8 weeks according to season. The resultant saving in freight charges exceeded the cost of drying, independent of any profits possible by charging a higher price where a 'dry-lumber' level of m.c. had been reached.

3872. DIPPEL, W. Neuartige Feuchtemessung in Holztrockenanlagen. **[A new method of measuring moisture content in kilns.]** *Holztechnik* 39 (2), 1959 (47–8). [G.] P.R.

Describes the principle of the LiCl moisture meter, which expresses the m.c. of the air in kilns in g. of water per cu.m. of air.

3873. GATLICK, H. B., and DAY, W. L. **Automatic recorder-controller for lumber dry kilns.** *Wood Wkg.* 60 (12), 1958 (27–31). P.R.

Discusses the working principles of recorder-controllers with descriptions and diagrams of a pneumatically operated apparatus allowing the controlled kiln-drying of lumber to within 1° F.

3874. KOLLMANN, F., and SCHNEIDER, A. Ein neuer Laboratoriumstrockner für Trocknungsuntersuchungen in einem weiten Bereich der Temperatur, relativen Feuchtigkeit und Strömungsgeschwindigkeit. **[A new laboratory kiln for investigations over a wide range of temperature, relative humidity and air velocity.]** *Holz Roh- u. Werkstoff* 15 (12), 1957 (489–96). [G.e.] P.R.

Communication No. 1 of a series of research reports on kiln drying planned at the Institut für Holzforschung und Holztechnik, Munich University. Special features of the elaborate kiln include infra-red radiation equipment, self-recording weighing devices, etc.

3875. **Wood seasoning and preserving. Low cost solar kiln shows promise.** *Wood-Worker, Indianap.* 77 (10), 1958 (33). P.R.

Since June 1958, research has been going on at Madison, on an experimental solar-heated, black painted, corrugated-metal kiln drier, round which is wrapped a thin polythene skin, held ca. 4 in. beyond the exterior of the structure by black wooden studs, in order to recapture any deflected sun rays. Air circulation is controlled by manually operated vents and a centrally located fan that is switched off during sunless periods. Initial temperature data on inçoming solar radiation as recorded by thermocouples placed strategically inside the kiln will be fully analysed once economical operating factors are established, but since, at the time of writing, a 50-day-old charge in the kiln seems likely to reach satisfactory conditioning within 30 days, the possibility of an 80-day schedule appears promising when compared with the 210 days normally required to air-dry the same charge. Winter operation shows promise of maximum advantage.

3876. MALMQUIST, L., and MEICHSNER, H. Betriebsmessungen an Hochtemperaturtrockenanlagen. **[Investigations on high-temperature kilns.]** *Holz Roh- u. Werkstoff* 16 (7), 1958 (263–73). 5 refs. [G.g.e.] P.R.

Results of measurements in high-temperature kilns drying 1- to 1½-in. Pine boards stacked in various ways (illustrated) are shown in graphs and tables. Factors examined were: distribution of temperature, air velocity, and final moisture content in various parts of the stacks, consumption of power (1·40–1·86 KWH) and the mean over-all heat transfer (1·5 kcal./sq. m. hr. ° C.). Temperature differences in the longitudinal direction of the kiln were mainly related to variations in stacking density. Mean velocity was 1·9–2·4 m./sec., varying with stacking methods. The standard deviation in final moisture content for mean values of 5·0 to 9·8% was 1·07–1·88%. The wood was free from checks at drying temperatures of 120° C. when the wet-bulb temperature was not allowed to drop below 95° and the initial heating had been adequate. Laboratory tests showed that the green density of the wood and the position of the annual rings in this sample (mainly horizontal or mainly vertical) influence the results.

3877. ELLWOOD, E. L. **Problems and prospects in drying California hardwoods for high-quality use.** *Calif. For. & For. Prod. Calif. For. Prod. Lab.* No. 8, 1958. pp. [5]. 7 refs.

Recommends general handling procedure and seasoning practices for *Quercus kelloggii, Lithocarpus densiflorus, Castanopsis chrysophylla* and *Arbutus menziesii*, which are all refractory. Figures are tabulated on radial and tangential shrinkage by two methods of seasoning.

3878. **Kiln drying characteristics of foreign woods.** *Wood-Worker, Indianap.* 77 (9), 1958 (29, 38). P.R.

Lists by their trade names 43 species imported into the U.S.A., with notes on their seasoning characteristics.

3879. JOHNSON, P. **Time schedules for kiln drying heavy segregation Redwood lumber.** *Research Project, California Redwood Association, San Francisco* No. 3.222120 (*Interim Report A*), 1958. pp. 1 + 5 gphs. P.R.

Schedules are presented, from data derived from 93 million bd. ft. of 1-in. lumber ['heavy segregation' implying the need for prolonged air-drying before kilning] dried in 1955–57 by the Simpson Redwood Co., Arcata, Calif.

3880. WALTER, F. Did Eigenschaften des Holzes nach der Trocknung. **[Wood properties after seasoning.]** *Holzindustrie, Berlin* 11 (1), 1958 (13–7). 5 refs. [G. g.] P.O.

Pine and Beech boards were subjected to air-drying, and to seasoning at 70 and 115° C., and the density, m.c., swelling, elasticity, static bending strength, compression strength, and impact bending strength of samples were determined. Only negligible differences were found between the properties of wood dried by the different methods.

848. Timberyard Practice. Handling and Storage of Timber

See also Nos. 3791, 3837, 3844, 3899.

3881. JEFFREY, M. **The mechanical handling of timber: a survey of recent developments.** *Wood* 24 (2), 1959 (68–71).

Rail bogies, cranes, fork-lifts, side-lifts, conveyors etc., with particular emphasis on unloading from ships, and the advantages of packaged timber.

3882. **Fowler loader.** *For. Equipm. Notes, FAO* No. *D*.20.58, 1958. pp. 1.

Briefly describes (with 2 photos) an apparatus for loading railway wagons, specially designed for handling timber, and quickly fitted to the forks of a lift-truck. Manufactured by the Signode Steel Strapping Co., Chicago.

3883. LEMEHOV, A. N. Kontejnernaja pogruzka rudničnoj stojki. **[Loading pit props in containers.]** *Lesn. Prom.* 1958 (12), (19–21). [Russ.]

The use of a simple framework [illustrated] consisting basically of 4 wooden uprights, connecting cross-pieces, and wire ropes, and holding 6–8 cu.m. of pitprops 1·5 m. long, increased output per shift considerably in loading the props by crane on to boats and railway wagons.

3884. La conservation des copeaux en papeterie. **[The storage of wood chips for use in pulp mills.]** *Rev. int. Bois* 25 (247), 1958 (225–6). [F.]

Discusses the problem of storing large quantities of wood chips, and describes methods of piling etc. observed in France, Sweden and the U.S.A.

85. Grading of Wood and Wood Products

851. Timber Quality in General

See Nos. 3125, 3166.

852. Detection, Recognition and Assessment of Injuries and Defects

See also Nos. 3221, 3676.

3885. CARVALHO, A. DE. Defeitos da madeira. I Parte. **[Defects in timber. Part I.]** Estudos e Divulgação Técnica, Direcção Geral dos Serviços Florestais e Aquícolas, Lisbon. 1957. pp. 143 + 29 plates. Many refs. [Port.port.e.]

Deals with defects developing before conversion, under the following sections, each with its own bibliography and summaries: (1) frost rings (with particular reference to *Pinus pinaster* and *Larix decidua*), (2) shakes in wood of *L. decidua*, (3) compression failures, (4) knots, (5) frost cracks, (6) pitch pockets, (7) compression wood in the case of geotropic curvatures, and (8) fluting of the stem.

3886. HILLIS, W. E., and CARLE, A. **Extractives from Klinki Pine (*Araucaria klinkii* Lauterbach).** *Nature, Lond.* 182 (4649), 1958 (1593–4). 9 refs.

The wood of mature *A. klinkii* frequently shows pink areas running parallel to the grain and frequently adjacent to areas of decay. Tests in which the pink wood was extracted and chromatographed are described. The properties of the compounds obtained suggest that they are lignin-degradation products, possibly the products of microbiological action.

3887. PEREM, E. **The effect of compression wood on the mechanical properties of White Spruce [*Picea glauca*] and Red Pine [*Pinus resinosa*].** *For. Prod. J.* 8 (8), 1958 (235–40). 7 refs.

Reports on tests in green and air-dry condition on compression wood of varying intensity from 7 trees of each species (one control). On a unit weight basis, compression wood was inferior to normal wood in the properties tested (compression ||, static bending, and toughness), but when density was disregarded, it was superior except in toughness air-dry.

3888. ELMENDORF, A., and VAUGHAN, T. W. **A survey of methods of measuring smoothness of wood.** *For. Prod. J.* 8 (10), 1958 (275–82). 10 refs.

Discusses both optical methods based on reflection, shadows thrown by oblique lighting etc., and mechanical ones, describing in particular the application of the German Forster apparatus [cf. *F.A.* 20 No. 2542] and the British Talysurf, both designed for metals, to the testing of surfaces of various woods and particle boards after planing, sanding etc. The Talysurf (Taylor, Taylor and Hobson) uses a diamond stylus with a 90° pyramidal point ca. 2·5 μ wide at its tip, and is capable of magnifying up to × 50,000 vertically, and × 100 horizontally, best results being obtained with a 10/1 ratio. Micro-sealing [cf. *F.A.* 19 p. 633] considerably improved smoothness.

3889. NIESEN, H. Oberflächen-Untersuchungen an mit Polyesterlacken beschichteten Hölzern. **[Investigations on wooden surfaces coated with polyester lacquers.]** *Holz Roh- u. Werkstoff* 17 (1), 1959 (30–2). 1 ref. [G.g.e.] P.R.

[Cf. *F.A.* 20 No. 2542.] A more sensitive instrument (× 30,000 magnification in the vertical direction), made by the firm Leitz, Wetzlar, was used to measure roughness in polyester-lacquered wooden (Birch and Rosewood) surfaces. Results of measurements are discussed; they show that unevennesses of 0·01 μ could be detected and recorded.

3890. WAŁEK-CZERNECKA, A. Obrazy mikroskopowe pęknięć w drewnie bukowym. **[Microscopic checks in Beech wood.]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 12, 1957 (1958), (105–20). 12 refs. [Pol.pol.russ.e.]

Presents further results of a study on Beech [cf. *F.A.* 18 No. 4527]. Checks appearing on the end surfaces of logs and boards during drying extended along the rays, in the rays, or between the large rays, and originated along the planes of least resistance. In tension wood, checks were longer, wider and deeper, but not more numerous. Checks occur in late wood through the separation of fibres, and in early wood by the parting of cells or the breaking of the cell-walls. The vessels are most easily broken, and the prosenchymatous rays least. In seasoning, rays shrink less tangentially than the fibres. *From author's summary.*

3891. KAUMAN, W. G. **The influence of drying stresses and anisotropy on collapse in *Eucalyptus regnans*.** *Div. For. Prod. technol. Pap. For. Prod. Aust.* No. 3, 1958. pp. 16. 13 refs. P.R.

Specimens of *E. regnans* of 4 × 1-in. rectangular cross-section, and 1 in. long, were prepared with the growth rings (*a*) parallel, (*b*) perpendicular and (*c*) at 45° to the 4-in. faces. The specimens were kiln-dried at 120, 150 and 180° F. at two levels of r.h. Total shrinkage and collapse in a given structural direction were greatest when that direction was parallel to the thickness, and least when it was parallel to the width, of the cross-section. Restraint in a particular direction resulted in increased total shrinkage ⊥ to that direction. The observations show that permanent deformations due to drying stresses contribute significantly to the total shrinkage and collapse. *Author's summary.*

854. Grading of Converted Timber

3892. THUNELL, B. **Quality grading and non-destructive testing of timber.** Translation Service, Department of Internal Affairs, Wellington, New Zealand. 1958. pp. 15. 2 tbls. Transl. from *Medd. svenska TräforsknInst.* (*Träteknik*) No. 64 *B.* [Cf. *F.A.* 17 No. 2195.] Limited distribution.

3893. WILHELMI, T. Die Schnittholzsortierung in den Vereinigten Staaten (U.S.A.) mit vergleichendem Hinweis auf deutsche Sortierregeln. **[The grading of sawn timber in the U.S.A. in comparison with German grading rules.]** *Mitt. BundesforschAnst. Forst- u. Holzw.* No. 41, 1958. pp. 24. 27 refs. [G.e.]

Includes a list of the chief American grading rules and the species to which they apply, with explanations or translations of the chief terms used, defects, standard dimensions, assortments, and examples from the chief grading rules for hardwoods and softwoods etc.

3894. CANNING, V. C. **Grading and price differential.** *Aust. Timb. J.* 24 (9), 1958 (33 . . . 37).

Makes suggestions for 4 grades based on end use to replace the existing Australian 2-grade system. Mill studies should be made to determine the % of the grades in the outturn, e.g. for Tasmanian forest 65% select (of which 10% are clears), 30% standard and 5% commons. In order to encourage the use of the lower grades for end uses for which they are adequate, there should be well marked price differences in the grades. Weighted average prices can then be calculated, to yield the mean sales revenue that will cover production costs plus the same profit. Build-up of the miller's brand and grade marks is important.

3895. **Asia-Pacific regional grading rules for Teak squares.** FAO, Rome. No. *FAO/TSC-57 B* Rev. 1, 1958. pp. 26 + 1 tbl.

These rules, approved at the Second Session of the Teak Sub-Committee at Bandung in 1957, are based largely on the Seaman-Limaye Rules of 1936.

86. Pulp Industries. Composite Materials made Wholly or Partly of Woody Matter. Chemical Utilization of Wood

See also No. 3228.

861. Pulp and Paper Manufacture. Textile and Other Cellulose Derivatives

See also Nos. 2882, 3628, 3634, 3653, 3656, 3666, 3676, 3728–9, 3749, 3884.

3896. WANGAARD, F. F. **Research on quality of wood in relation to its utilization as fiber for papermaking.** *Norsk Skogind.* 12 (8), 1958 (286–95). 32 refs. [E.nor.] P.R.

Discusses research, mainly American but including for comparison some Scandinavian, on factors affecting pulp yield, wood properties in relation to pulp quality, and growth factors (e.g. growth rate, age of tree, and position in tree) affecting wood quality. Special attention is given to rate of growth, and data for Douglas Fir and Slash Pine [cf. *F.A.* 19 No. 2330] are used to show that, if sampling is arranged so as to eliminate the effect of age (number of rings from the pith), ring width has little influence on pulp yields.

3897. KLEMM, K. H. **Wood as a raw material for groundwood pulp.** *Paper Tr. J.* 141 (31), 1957 (35–9). 17 refs. P.O.

Discusses the effect of wood chemistry, structure and density on its pulping properties.

3898. KLEMM, K. H. **Effect of pulpwood quality in groundwood pulp production.** *Paper Tr. J.* 141 (32), 1957 (50–5). 12 refs. P.O.

Discusses the effect of species, storage, moisture content, resins, age, shape of bolt, ratio of early and late wood etc. on quality and yield. Most of the figures cited are from European research on Spruce.

3899. KLEMM, K. H. **Pulpwood transportation to the mill and methods of storage.** *Paper Tr. J.* 141 (33), 1957 (46–9). 7 refs. P.O.

Methods, and the effect of transport and storage on wood and pulp properties, based on European experience.

3900. DAHM, H. P., BRANDAL, J., and HELGE, K. Törkning av ved og masse og dens innvirkning på massefabrikasjon og en del kvalitetsfaktorer. **[Drying of wood and pulp and its effect on pulp manufacture and a number of quality factors.]** *Pap. ja Puu* 40 (7), 1958 (355–60). [Nor.e.*e.*] P.R.

Groundwood pulp from Spruce of 40·3% m.c. was found to have significantly higher strength properties than that from Spruce of 27·5%. Asplund pulp and softboard from fresh Spruce sapwood (53·4% m.c.) and from that dried at room temperature to 12·1% were similar in properties (fibre-length distribution, drainage time, strength in relation to density), whereas those from slabwood stored for 1½ years and of 17·0% m.c. were significantly different. Increasing the preheating and defibration period reduced the differences. Experiments showed that Birch semi-chemical pulp could be dried without reduction of breaking length or stiffness.

3901. HÖPNER, T. Zellstoffaser und Pflanzensystem. **[Pulp fibres and plant classification.]** *Papier, Darmstadt* 11 (11/12), 1957 (229–37). 11 refs. [G.g.e.f.] P.O.

Presents results of research on a number of plant materials, including new results for e.g. *Nipa fruticans*, *Dracaena draco*, *Pinus insularis*, *Agathis borneensis*, *A. loranthifolia*, *Ginkgo biloba*, giving data on fibre dimensions, with photomicrographs, and paper-making properties.

3902. HYTTINEN, A., KELLER, E. L., and SCHAFER, E. R. **Experiments on the groundwood and sulfite pulping of Subalpine Fir.** *Rep. U.S. For. Prod. Lab., Madison* No. 2122, 1958. pp. 7 + 6 tbls. P.R.

Understorey and mature Subalpine Fir both gave groundwood pulps of good strength but somewhat lower brightness than Spruce and Aspen groundwood pulps. The Fir pulps were suitable for book and newsprint papers. Sulphite pulps of Fir were at least as strong as Western Hemlock pulps, except in tear strength, and at least comparable to Black Spruce pulps, except in bursting strength. Unbleached Fir pulps were less bright than normal Spruce pulps.

3903. HYTTINEN, A., *et al.* **Pulping of Northern Whitecedar and Tamarack.** *Rep. U.S. For. Prod. Lab., Madison* No. 2128, 1958. pp. 6 + 7 tbls. P.R.

Summarizes and tabulates results of groundwood, sulphate and sulphite pulping experiments made on samples of *Thuja occidentalis* and *Larix laricina* from northern Wisconsin. These indicated a favourable comparison with Spruce and Jack Pine in terms of pulp strength and yield.

3904. SCHAFER, E. R., PEW, J. C., and CURRAN C. E. **Grinding of Loblolly Pine. Relation of wood**

properties and grinding conditions to pulp and paper quality. *Rep. U.S. For. Prod. Lab., Madison* No. 1163 (rev.) 1958. pp. 10 + 8 tbls. 4 refs. P.R.

Describes experiments confirming the feasibility of making satisfactory groundwood from properly selected Southern Pine. For newsprint purposes the best wood is that with < 10 rings/in. and < 35 years old. Green wood yielded better pulp than seasoned. Compression wood lowered the pulp strength and colour in proportion to the amount present. Heartwood in young, fast-grown Pine did not impair pulp colour or cause pitch trouble; in older, slower-grown Pine, heartwood increased pulp strength, but pulp from this wood (with or without the heartwood) was of poorer colour, and pitch troubles were in evidence.

3905. FLAMM, E., and BELLAK, F. Vergleich von Sulfatzellstoff aus Lärchen- und Kiefernholz. [**A comparison of sulphate pulp from Larch and Pine.**] *Holzforsch. u. Holzverwert., Wien* 9 (1), 1957 (12–3). [G.g.] P.R.

Physical properties of the two pulps were compared and found to be similar.

3906. CHEN, W. L. **Newest kraft pulp and paper mill in Formosa uses Bamboo.** *Paper Tr. J.* 142 (36), 1958 (40–6). P.O.

Describes the preparation of raw material, layout, equipment and methods at the mill of the Longlived Pulp and Paper Corp. Ltd., at Chu Nan. Species successfully used are *Phyllostachys reticulata, P. edulis, Bambusa stenostachya,* and *Dendrocalamus latiflorus.*

3907. GUHA, S. R. D., BAKSHI, B. K., and THAPAR, H. S. **The effects of fungus attack on Bamboo on the preparation and properties of pulp.** *J. sci. industr. Res. India* 17*C* (4), 1958 (72–4). P.O.

The decay caused by the white-rot fungi *Daedalea flavida, Polystictus sanguineus* and *Lentinus praerigidus* on *Dendrocalamus strictus* was studied. All caused some damage, that by *D. flavida* being extensive. Lignin content in the cell-wall was depleted, but since the lignin % remained the same in damaged and undamaged Bamboo it is concluded that the fungi attack other cell-wall constituents. Strength properties of pulps from decayed chips were appreciably reduced and this is explained by the perforations and corrosion marks in the cell-walls (illustrated by photomicrographs) caused by the fungi.

3908. HALE, J. D. **Physical and anatomical characteristics of hardwoods.** *Pulp Paper Mag. Can.* 59 (12), 1958 (142–50). 25 refs.

Paper presented to the International Fundamental Research Symposium, Montreal, P.Q., Sept. 1958. A general review, including recent (and unpublished) research, with particular reference to pulp and paper technology.

3909. MUTTON, D. B. **Hardwood resin.** *Tappi* 41 (11), 1958 (632–43). 78 refs. P.R.

Reviews the possible effects of hardwood resin on pulp quality, and describes techniques, including seasoning, for controlling resin content. Studies on the chemical changes occurring in the resin of White Birch [*Betula papyrifera*] seasoned under various conditions showed the major change to be the conversion of fatty esters to free fatty acids. The removal of the fine-fibre fraction as a means of reducing the resin found largely in the very short ray-parenchyma cells, and other de-resination methods involving the use of surfactants in the hot alkaline stage, are also reviewed.

3910. DAHM, H. P. **NSSC pulp from mixtures of Birch and Spruce.** *Norsk Skogind.* 12 (11), 1958 (405–10). 2 refs. [E.e.nor.] P.R.

Pulps from a mixture of Birch (*Betula pubescens*) with up to 30% Spruce gave a corrugating material equal to that from Birch alone, but with higher % of Spruce it would become impossible to obtain a dense paper with a reasonable amount of beating.

3911. COLLINS, R. E. **What Crossett has learned about semi-chemical pulping and bleaching of hardwoods.** *Paper Tr. J.* 141 (33), 1957 (36–8). P.O.

Species used are Red Gum, Red Oak and White Oak mixed in the proportions available at the time. Barking, chipping, cooking, washing, screening and bleaching methods are described. Good-quality pulp is obtained, and White Oak proves no more difficult to pulp than any other hardwood.

3912. WIĘCKO, E. Problem wykorzystania drewna buka w przemyśle celulozowo-papierniczym w Polsce. [**The problem of using Beech wood in the pulp and paper industry in Poland.**] *Sylwan* 101 (12), 1957 (70–9). 17 refs. [Pol.]

Reviews the rapid post-war increase in paper consumption in Europe, and analyses the increase in greater detail for Poland, tabulating data on the area and standing volume of Beech, and discussing technical problems in the use of Beech wood as a raw material in pulping. [Cf. *F.A.* 18 No. 4757.]

3913. BROWN, C. L., SAEGER, G., and WEINER, J. **Constitution and pulping of Aspen and Poplar woods.** *Bibliographic Series, Institute of Paper Chemistry, Appleton, Wis.* No. 184, 1957. pp. 120.

Contains 317 abstracts arranged alphabetically under authors. In preparing the bibliography, *Bulletins of the Institute of Paper Chemistry* (*Library Notes*) and *Chem. Abstr.* up to and including 1956, and TAPPI bibliographies between 1900 and 1955 were examined. References to breeding have been omitted.

3914. BRECHT, W., and PULST, S. Die Herstellung von chemischen Schliffen aus Pappelholz. [**Chemical groundwood from Poplar.**] *Holz Roh- u. Werkstoff* 14 (6), 1956 (234–41). 6 refs. [G.g.] P.R.

Reports on laboratory tests with Poplar wood [unspecified] from the Rhine flood-plain, using either no pretreatment, or simple cooking and steaming, or various chemical pretreatments including the fairly severe Libby-O'Neil process [cf. *F.A.* 12 No. 3180] and compares results with similar treatments of Spruce, Beech and Birch, as regards energy consumption, yield, colour, composition, and paper properties [cf. *F.A.* 15 No. 2036 for untreated Poplar]. Chemical pretreatment produced Poplar

groundwood with strength properties superior to both untreated mechanical Spruce pulp and chemically pretreated Birch and Beech, plus good colour and good dehydration properties.

3915. Overbeck, W., and Agottani, C. Über die Gewinnung von gebleichtem Sulfatstoff aus gemischten Laubhölzern des subtropischen brasilianischen Urwalds. **[Producing bleached sulphate pulp from mixed hardwoods of the Brazilian subtropical virgin forest.]** *Papier, Darmstadt* 12 (13/14), 1958 (371–8). [G.g.e.f.] P.O.

Experiments with a mixture of 11 frequently occurring species showed that satisfactory bleached pulps could be produced by limiting the cooking time at maximum temperature and keeping the latter as low as possible.

3916. Höpner, T. Zellstoffholz aus aller Welt. **[Raw material for pulp from the whole world.]** *Papier, Darmstadt* 12 (5/6), 1958 (92–100). 15 refs. [G.g.e.f.] P.O.

Some 60, mainly tropical, hardwood and softwood species were studied, factors examined being structure, behaviour during sulphate pulping, and strength properties of pulps. Tables are given showing characteristics of selected species with high (*Rhizophora mangle*, *Lophira alata*, *Eucalyptus globulus* and *Strombosia pustulata*) or low (*Ochroma lagopus*, *Ceiba pentandra*, *Albizzia falcata* and *Aleurites moluccana*) specific gravity, and long (*Agathis loranthifolia*, *Araucaria angustifolia*, *Pinus merkusii*, and *S. pustulata*) or short (*Lovoa klaineana*, *Shorea parvifolia*, *S. leprosula* and *Fagus sylvatica*) fibres. A further table shows species, yielding pulp of good strength, with their pulp characteristics; these include *O. lagopus*, *Albizzia falcata*, *S. leprosula*, *Khaya ivorensis*, *Terminalia ivorensis*, *Brachystegia leonensis*, *Gigantochloa verticillata* and *Agathis loranthifolia*. It is concluded that very good pulps, though not superior to those from Poplar hybrids or Spruces, can be obtained from tropical woods.

3917. Keller, E. L., Kingsbury, R. M., and Fahey, D. J. **Neutral sulfite semichemical pulping of Guaba (*Inga vera*), Yagrumo Hembra (*Cecropia peltata*), and Eucalyptus (*Eucalyptus robusta*) from Puerto Rico.** *Rep. U.S. For. Prod. Lab., Madison* No. 2127, 1958. pp. 7 + 7 tbls. P.R.

Studies the pulping qualities of low-grade wood of these species.

3918. **Summary of pulping and papermaking experiments on *Eucalyptus*.** *Rep. U.S. For. Prod. Lab., Madison* No. 2126, 1958. pp. 5 + 12 tbls. P.R.

Summarizes and tabulates results of pulping tests made at Madison over the past 31 years on commercial Eucalypts.

3919. Bugg, E. J., and Pearson, A. J. **Manufacture of cold soda pulp from Eucalypt woods. [With discussion.]** *APPITA, Melbourne* 12 (3), 1958 (73–87).

Describes the equipment and processes at the mill at Boyer, Tasmania, and lists typical data on strength properties and production, for pulps from several species of Eucalypts.

3920. Somerville, J. L., and Pearson, A. J. **Application of the cold soda process in the use of Eucalypts for newsprint manufacture.** *APPITA, Melbourne* 12 (3), 1958 (57–72). 20 refs.

Cold soda pulps were made from old and regrowth trees of *Eucalyptus regnans*. *E. obliqua* and *E. gigantea*. Pulp from green chips was as strong as that from air-dried chips. A high soda penetration and a pulp strength approaching maximum were obtained with chip length of ca. ½ in. The higher soaking temperatures (up to 60° C.) gave stronger but duller pulps. The presence of polyphenols in the woods caused the spent liquors to be much darker than those from similar pulps of Aspen. The qualities and properties of the pulps, suitable pulp mixtures, conditions for brightening the pulps, etc. are dealt with.

862. Composite Materials made Wholly or Partly of Woody Matter

See also Nos. 3682, 3691, 3727, 3900, 3955.

3921. Connelly, H. H. **Quality control of particle board for furniture makers.** *Wood-Worker, Indianap.* 77 (10), 1958 (6–7, 19–20). P.R.

Emphasizes the necessity for evolving a thorough testing procedure for particle board and describes various methods and testing equipment used in the U.S.A. for assessing such properties as tensile strength, screw-holding capacity, density, modulus of rupture, and static bending values.

3922. Post, P. W. **Effect of particle geometry and resin content on bending strength of Oak flake board.** *For. Prod. J.* 8 (10), 1958 (317–22). 3 refs.

Within the experimental limits—particles varying from 0·5 to 4 in. in length and 0·006 to 0·05 in. in thickness, and resin from 3·27 to 13·07 g. per sq. m. surface area—modulus of rupture increased with increasing length, and decreasing thickness (except for the thinnest dimension), with the highest values for flakes 0·012 in. × 4 in. The effect of increased resin content was less marked. Green *Quercus coccinea* pulpwood was used.

3923. Keylwerth, R. Zur Mechanik der mehrschichtigen Spanplatte. **[The mechanics of multilayer particle boards.]** *Holz Roh- u. Werkstoff* 16 (11), 1958 (419–30). 3 refs. [G.g.e.] P.R.

The determination of surface-layer thickness and control of its scatter is described. This makes it possible to determine the ratio of surface-layer thickness to that of the whole board, and thus to calculate board properties from the component layers. These interrelationships are examined with reference to density, moisture content, resin content, modulus of elasticity, shear modulus, stress and strain characteristics, and tensile, compression, bending and shear strengths. The most characteristic property of a good 3-layer board is a relatively high bending and shearing resistance. *From author's summary.*

3924. Aleksandrov, E. A. Vlijanie čistoty poverhnosti plit iz drevesnyh častic na kačestvo ih fanerovanija. **[The influence of surface cleanness of**

particle board on veneering quality.] *Derev. Prom.* 7 (9), 1958 (7–9). [Russ.russ.] P.R.

Particle boards were made by hot-pressing (18–20 kg./sq. cm.; 140° C., 8–10% binder) from (1) size-graded chips from a planer and spindle-moulder; (2) sawdust; (3) comminuted pieces from the ODAL-H7 woodworking machine; and (4) specially cut smooth chips 0·1–0·3 mm. thick. Surface quality of the boards was measured and found to depend on the dimensions and shapes of the particles used. The surface roughness was proportional to particle thickness. It was concluded that high-quality boards should be made of 3 layers, using (4) for the outer layers, and (1) or (3) for the inner layer. Boards faced with (4) can be veneered with sliced Oak veneer 0·5–1 mm. thick without further treatment, provided that their surface roughness does not exceed 200–250 μ, and with Walnut veneer provided that their roughness is $\not>$ 150–200 μ.

3925. SCHWARTZ, S. L. **Hardboard from Lodgepole Pine, Engelmann Spruce, and Douglas Fir.** *Rep. U.S. For. Prod. Lab., Madison* No. 2123, 1958. pp. 4 + 2 tbls. 5 refs. P.R.

Discusses methods and results of an investigation to assess the suitability of these species for hardboard.

3926. KUMAR, V. B. Untersuchungen über die Dickenschwankungen bei Holzfaserplatten. **[Investigations on thickness variation in fibreboards.]** *Holz Roh- u. Werkstoff* 16 (10), 1958 (371–7). 18 refs. [G.g.e.] P.R.

Discusses variations in fibreboard thickness in so far as they are caused by pressing. Measurements were made on boards taken from daylights 1, 3, 5, 10, 15, 19, and 20 of a multi-daylight (20) press. These showed that boards from the top daylight are usually thicker at the ends than in the centre, while boards from the lower daylights may have their centres thicker than the ends. Boards pressed in the central daylights are fairly uniform. The greatest thickness variations occur in the upper daylights. The probability of rejects due to boards exceeding tolerances falls sharply from the 3rd daylight but increases slightly after the 19th.

864. Utilization of Lignin

3927. ATANASIADE, G., and ILLE, A. M. **Preparation of vanillin from coniferous sawdust.** *Lucrările Institutului Cercetări Alimentare, Bucharest* 2, 1958 (65–78). [Rum.] From *abstr.* in *Chem. Abstr.* 52 (19), 1958 (16739). P.R.

Sawdust of common gymnosperms was treated with $C_6H_5NO_2$ to give vanillin. The product contains 19·1% vanillin on the basis of the lignin in the sawdust or 5·12% by weight of the sawdust; $(C_6H_5N{:})_2$ (65%), which is used in the dye industry, was obtained as a by-product.

866. Utilization of Wood Extractives

3928. RAO, P. S., and BHATIA, K. **The indigenous agar oil industry of Assam and suggestions for its improvement.** *Indian For.* 85 (1), 1959 (51–5 + 2 plates). 6 refs.

[Cf. *F.A.* 13 No. 3477.] Describes the method of distilling used in Assam, presents analyses of the oil, and discusses distillation equipment and the need for centralized purification of the oil in Assam.

3929. VARMA, B. S., *et al.* **Manufacture of *katha* and cutch on cottage-scale basis.** *Indian For.* 84 (11), 1958 (672–7).

Describes the indigenous manufacture in the forest and its defects, and details improved procedures and equipment, tested by the authors, whereby forest workers can match the factory product (including the full recovery of cutch). Analyses of the *katha* produced by the old and new methods are compared. [Cf. *F.A.* 19 No. 1173.]

867. Destructive Distillation

See also No. 3822.

3930. KRYSINSKIJ, B. V., and VYSOTSKAJA, V. A. Polučenie uksusnoj kisloty putem okislenija drevesiny vozduhom ili čistim kislorodom. **[Producing acetic acid by oxidizing wood with air or pure oxygen.]** *Gidrol. lesohim. Prom.* 11 (5), 1958 (7–10). 18 refs. [Russ.russ.] P.R.

Wood waste oxidized in O or air at 16 atm. pressure and 100–160° C. in the presence of Na_2CO_3 or $Ca(OH)_2$ gave a yield of 50–60% volatile acids, of which acetic acid formed 70–85% and formic acid 15–30%. Any species of wood waste appears to be suitable. As the cost of production is low, this method is considered to have industrial possibilities.

89. Other ('Minor') Forest Products

3931. ZIEGER, E., and BLOSSFELD, O. Intensivierung der forstlichen Nebennutzungen unter besonderer Berücksichtigung der Fichtengerbrindennutzung. **[Intensifying the utilization of minor forest products, particularly Spruce tanbark.]** *Repr.* from *Wissenschaftliche Zeitschrift der Technischen Hochschule Dresden* 6 (1), 1956/1957 (167–78). [G.g.]

Briefly discusses practical and economic potentialities of berry and fruit crops, edible fungi, fur-bearing animals, and *Rhus typhina* plantations in E. Germany. Spruce tanbark is thought to be of importance for some time yet. Though harvesting costs per kg. bark in 60-year stands were greater than in 110-year stands, higher quality and greater tannin content compensated for this. Results of girdling tests [cf. *F.A.* 19 No. 4243] were promising.

892. Vegetable Products

See also No. 2739.

892.4. Bark Products. Tanstuffs. Cork

See also Nos. 3213, 3228, 3929, 3931.

3932. STOJANOV, V., *et al.* Smărčovata kora kato surovina za proizvodstvo na dăbilni ekstrakti. **[Tannins from Spruce bark.]** *Izv. Inst. Gorata bălg. Akad. Nauk., Sofia* No. 2, 1957 (143–53). [Bulg.bulg.russ.g.]

Analyses of tannin content in Spruce bark stored and dried under different conditions showed that bark harvested in winter should be kept $\not>$ 15 days on the felling site, under brushwood cover; and at the factory, air-dried under cover with good ventilation.

3933. Endres, H. Über die Chemie des Gerbstoffes der Fichtenrinde. **[The chemistry of Spruce bark tannin.]** *Leder, Darmstadt* 8 (9), 1957 (222–9). 39 refs. [G.g.e.f.span.] L.S.

From the cambium of fresh Spruce bark, a mixture of different tannin-like glucosides was extracted with ethyl acetate under conditions which excluded oxidative changes. From this mixture, a crystalline glucoside was separated chromatographically. The corresponding crystalline aglucone was also isolated by fermentative removal of the sugar, and its structure largely determined. *From author's summary.*

3934. Endres, H. Über die Gerbstoffe der Fichtenrinde. VIII. Die Konstitution des Piceatannol-glucosids. **[The tannins of Spruce bark. VIII. The constitution of piceatannol-glucoside.]** *Chem. Ber.* 91 (3), 1958 (636–8). 6 refs. [G.] O.R.S.

3935. Booth, H. E., Herzberg, W. J., and Humphreys, F. R. ***Pinus radiata* (Don) bark tannin.** *Aust. J. Sci.* 21 (1), 1958 (19–20). O.R.S.

Summarizes earlier work on its use for tanning, and in glues. Experiments showed that bark fine enough to pass through a 44-mesh B.S.S. sieve, with water at room temperature as a solvent, gave a much lighter-coloured extract, free of insoluble formation, thus doing away with the main objections to its use for tanning. The ready and rapid reaction of the extract with formaldehyde, even at room temperature, allows its use for a hot-press plywood glue, a waterproof cold-setting glue and as a glue in hot-press chipboards. Details are given of conditions used in making these glues and of strength tests on them.

3936. Anderson, H., and Bilkens, A. **Investigations on the tannins of *Pinus radiata* bark.** *Plantat. tech. Pap. For. Comm. Vict.* No. 5, 1958 (2–8). 3 refs.

The clarified extract of *P. radiata* bark has been found to be slightly inferior to Wattle in colour and in its behaviour in hot pit liquors, but at least its equal in other respects.

3937. Ugarte Laiseca, J., *et al.* Laboratorio general de química forestal. Materias curtientes. **[General laboratory of forest chemistry. Tanning materials.]** *An. Inst. for. Invest. Exp., Madrid* No. 2, 1957 (82–7). [Span.]

Gives results of analyses for tannin content of *Quercus ilex*, *Q. suber*, *Q. pyrenaica* and *Q. robur*, and of experiments in preserving tannin extracts of *Rhus coriaria*. [Cf. *F.A.* 19 No. 2516.]

3938. Stojanov, V., Požarliev, G., and Koev, D. Našite dăbovi gori kato iztočnik na surovini za proizvodstvo na dăbilni ekstrakti. **[Bulgarian Oak forests as a source for tannin extracts.]** *Izv. Inst. Gorata bălg. Akad. Nauk., Sofia* No. 2, 1957 (155–74). [Bulg.russ.g.]

Tabulates results of analyses on the bark of *Q. robur*, heartwood of *Q. robur* and *Q. sessiliflora*, galls of *Cynips quercus-calycis*, and wood of *Q. conferta*, including roots, stump, branch and crown wood. These usually valueless parts of *Q. conferta* appear to be valuable raw material for the tannin industry.

3939. Hathway, D. E. **Oak-bark tannins.** *Biochem. J.* 70 (1), 1958 (34–42). 54 refs. O.R.S.

Presents results of the isolation of the free plant phenolics, and the purification of a phlobatannin fraction from Oak bark, and an investigation of the polyphenol-oxidase activity of the cambium and of the phenolics of mature leaves and the distribution of tannin extractives in stem bark.

3940. Żurakowski, M. **Some aspects of preparation of Oak-wood tannin extract.** *Prace, Instytut Przemysłu Skórzanego* 4, 1957 (78–114). [Pol.? e.] From *abstr.* in *Chem. Abstr.* 53 (3), 1959 (2663). P.R.

Describes the purification process of crude Oak extract.

3941. Alexa, G., *et al.* **Contribution to the knowledge of indigenous Rumanian vegetable tanning materials.** *Revue Technique des Industries du Cuir, Paris* 50, 1957 (147, 167). [F.?] From *abstr.* in *J. Soc. Leath. Tr. Chem.* 42 (11), 1958 (372). O.R.S.

Analysis of the inner part of bark from Birch of different ages and regions of Rumania showed a tannin content increasing with age to a maximum of 8·15%. The white outer layer of bark contains aromatic Birch oil, but practically no tannin. Birch bark extract gave poorer penetration than Quebracho but a comparable yield of leather. The tannin content of leaves of *Rhus cotinus* and *R. typhina* is greater when they have turned red, 16·66 and 12·34% respectively. Drying in an air current at 70 and 50° C. respectively gave maximum yields. Tannin of *R. cotinus* is more easily extracted and more astringent, but the leather obtained is similar apart from colour differences.

3942. Chiriţa, A. **Willow bark as tanning material.** *Industria Uşoară, Bucharest* 5, 1958 (49–52). [Rum.?] From *abstr.* in *Chem. Abstr.* 53 (1), 1959 (749). P.R.

The tannin content of barks of various *Salix* spp. was determined. On the basis of the preliminary study *S. triandra* and *S. viminalis* appear to be the best for use in reforestation.

3943. **[The sampling of Wattle bark.]** *Rep. Wattle Res. Inst. S. Afr. 1957/58*, 1958 (20).

[Cf. *F.A.* 19 No. 2519.] From information on tannin sampling obtained from the Chemistry Section, it seemed likely that a bark sample taken at ca. quarter-height of the tree would give a fairly good estimate of the average tannin content of individual trees. Therefore, just before felling a group of 20 trees ca. 10 years old, a vertical strip of bark 18 × 4 in. was removed from the quarter-height region of each tree and analysed separately. Comparison of these results with those of the total bark analysis showed no significant difference between the two. The ranking of these trees in descending order of tannin content on the quarter-height samples was tested against the true ranking on the total bark results by using Spearman's rank correlation coefficient method. This correlation was highly significant ($t = 3{\cdot}762$ with 18 d.f.). On these

results, the quarter-height sample of bark for tannin content is very encouraging, but further tests must be made before assuming that it will hold for all trees.

3944. ROUX, D. G., and MAIHS, A. E. **Black Wattle catechin.** *Nature, Lond.* 182 (4652), 1958 (1798). 10 refs.

The authors have isolated constituents *G*, *H*, and A_2 of Wattle (*Acacia decurrens* var. *mollissima*) tannins in pure crystalline form and shown them to be catechins. Constituent *H* was identified as (−)-robinetidol, and this is the first recorded isolation of a catechin(flavan-3-ol) of the resorcinol series from natural sources. Constituents *G* and A_2 were identified as (+)-catechin and (+)-gallocatechin respectively.

3945. ROUX, D. G., and EVELYN, S. R. **Condensed tannins. (1) A study of complex leucoanthocyanins present in condensed tannins. (2) Biogenesis of condensed tannins based on leuco-anthocyanins.** *Biochem. J.* 69 (4), 1958 (530–8); 70 (2), 1958 (344–9). 48 refs. O.R.S.

(1) Presents results of examination of heartwood extractives of 144 hardwood species, 33% of which gave positive reactions for leuco-anthocyanins, and more detailed results for the composition of tannins of Black Wattle and Quebracho. (2) Gives details of the isolation and characterization of a monomeric (−)-leuco-fisetinidin from the wood extractives of *Schinopsis quebracho-colorado* and of the identification of a monomeric leuco-robinetinedin and a leuco-fisetinidin in the fresh bark extract of *Acacia decurrens* var. *mollissima*. Discusses these and previous findings by various authors in relationship to the process of conversion of precursors into condensed tannins. [Cf. *F.A.* 19 No. 5004.]

3946. EVELYN, S. R. **The molecular weight of Black Wattle tannins. Part 4. The fractional extraction of fresh and commercial bark samples.** *J. Soc. Leath. Tr. Chem.* 42 (8), 1958 (282–8). 28 refs. O.R.S.

The various methods of fractionation are described, and results tabulated and discussed. Most of the tannin polyphenols in bark samples examined had molecular weights ranging between 900 and 1600.

3947. KHALIQUE, M. A., and AHMED, M. D. **Studies on indigenous tanning materials of East Pakistan. Part III. Effect of Sonari [*Cassia fistula*] upon Goran [*Ceriops roxburghiana*] tannage.** *Pakistan Journal of Scientific Research, Lahore* 9 (2), 1957 (72–4). 6 refs. C.G.B.

Leathers tanned by mixtures of these tannins showed improved quality but poorer colour than those tanned by Goran or Wattle alone. [Cf. *F.A.* 19 No. 1185.]

3948. NARAYANAMURTI, D., RAO, P. R., and RAM, R. **Adhesives from tannins in the bark of *Bruguiera* species.** *Trop. Woods* No. 109, 1958 (54–60). 15 refs.

[Cf. *F.A.* 19 No. 2363.] An alkaline powder (*a*) extracted from the bark of *B. gymnorrhiza* with boiling water and NaOH (0·5% of bark weight), was used in 3 glue formulations, with which plywood of 6 timber species was made and subjected to commercial tests. Results showed all to be satisfactory. The 3 formulations were (1) 100 parts by weight of (*a*), 120 of H_2O, 5 of paraformaldehyde and 5 of wood flour; (2) as (1) plus 5 of phenol; (3) as (1) plus 5 of water-soluble phenol-formaldehyde resin.

3949. HERRICK, F. W., and BOCK, L. H. **Thermosetting, exterior-plywood-type adhesives from bark extracts.** *For. Prod. J.* 8 (10), 1958 (269–74). 27 refs.

Describes the development of such adhesives by combining polyphenolic bark extracts (using bark of *Tsuga heterophylla*) with a polymethylolphenol. It can be supplied as powder or aqueous solution.

3950. NESTOROVIĆ, S. Industrisko vlakno iz mlade vrbove kore. **[Industrial fibre from young Willow bark.]** *Topola, Beograd* No. 5, 1958 (395–400). [Serb.]

The cost and uses of the industrial processing of Willow bark are discussed, and the author stresses the profitability of introducing this industry, particularly in basket-making centres.

3951. HERGERT, H. L. **Chemical composition of cork from White Fir bark.** *For. Prod. J.* 8 (11), 1958 (335–9). 16 refs.

The cork fraction of the bark of *Abies concolor* (oven-dry) was found to consist of 26% extractives (wax, catechin, epicatechin, tannin, phlobaphene, and carbohydrates), 18·8% hydroxy fatty acids, 26·7% phenolic acid, 4·7% low-molecular-weight phenols, 8·2% cell-wall carbohydrates, and 15·6% lignin. Potential uses are discussed. The substance called suberin by botanists was found to be a hydroxy fatty-phenolic ester.

3952. CORBETT, R. E., and MCDOWALL, M. A. **Extractives from the New Zealand Myrtaceae. Part III. Triterpene acids from the bark of *Leptospermum scoparium*.** *J. chem. Soc.* Oct., 1958 (3715–6). 4 refs. O.R.S.

892.5. Medicinal Plants, Edible Plants, Insecticides from Plants, etc.

3953. OLIVER, B. **Nigeria's useful plants. Part II. Medicinal plants (I).** *Nigerian Field* 24 (1), 1959 (13–34).

[Cf. *F.A.* 20 No. 2600.] Short notes, including the active principles and their action, the plants being arranged alphabetically; the section from *Abrus* to *Cassia* is included here (50 species).

3954. PAPY, R., and L'HERBIER, L. Nouveau catalogue des plantes médicinales de Tahiti. **[New catalogue of the medicinal plants of Tahiti.]** *Trav. Lab. for. Toulouse* 5, Sect. 2 (1), Art. 4, 1957. pp. 29. [F.]

3955. ĒBELE, V., and VASMANE, M. Skuju karotina preparats pārtikas vitaminizēšanai un skuju kompleksās izmantošanas iespējas. **[A carotene preparation from conifer needles for adding vitamins to food, and the possibilities of complete utilization of the needles.]** *Latvijas PSR Zinātņu*

Akademijas Vēstis, Riga No. 7, 1957 (69–79). 21 refs. [Latv.russ.] N.L.L.

The needles are treated with a 12–15% NaOH solution (1 part by weight to 2 of needles) and dried at 80–90° C. Light benzine is then used to extract the neutral substances, including carotene. The remaining material can be further processed to obtain other useful substances. From 1 ton of needles at 50% m.c., can be obtained: 10 kg. purified carotene preparation; 10 kg. substitute chlorophyll-carotene paste; 250 kg. (absolute dry wt.) of colouring for the furniture industry; 200 kg. fibrous material, which can be used in fibreboard preparation.

3956. NAKAOKI, T., and MORITA, N. **[Studies on the medicinal resources. X. Components of the leaves of *Juglans regia* L. var. *sinensis* C. DC. XII. Components of the leaves of *Cornus controversa* Hemsl., *Ailanthus altissima* Swingle, and *Ricinus communis* L.]** *J. pharm. Soc. Japan* 78 (5), 1958 (521–2, 558–9). 3 refs. [Jap.e.] O.R.S.

X. The component, juglanin, was identified as kaempferol 3-arabinoside. XII. Extracts of the leaves of *C. controversa* and *A. altissima* both contain quercetin 3-glucoside. *From authors' summary.*

3957. BÉZANGER-BEAUQUESNE, L. ***Aesculus hippocastanum.*** *Annales Pharmaceutiques Françaises, Paris* 15, 1957 (124–6). [F.?] From *abstr.* in *Chem. Abstr.* 51 (19), 1957 (15066). P.R.

The species contains flavonic substances, hydroxycoumarin, saponins and aminopurines. The only factors of value in the treatment of circulatory venous disturbances are the flavonoids.

3958. TALAPATRA, S. K., and CHAUDHURY, N. A. **Macralstonine, an alkaloid of the trunk bark of *Alstonia macrophylla* Wall.** *Sci. & Cult.* 24 (5), 1958 (243–5). 2 refs. E.M.B.

A note on the isolation, properties, spectral analysis (both ultra-violet and infra-red) and pharmacodynamic action, which is hypotensive in character, comparable with, but more pronounced than, that of rauwolscine, the principal alkaloid of *Rauwolfia canescens.*

3959. MAJOR, R. T., and DÜRSCH, F. **N^{α}, N^{α}-dimethylhistamine, a hypotensive principle in *Casimoroa edulis* Llave et Lex.** *J. organ. Chem.* 23 (10), 1958 (1564–6). 17 refs. O.R.S.

Gives the results of paper chromatographic analysis of an extract of the seeds.

3960. SUWANTATH, U. **[The exploitation of Mai Kaelae or Mai Lu'ang (*Cudrania javanensis*) in the district of Nakhawn Rachasima.]** *Vanasarn* 16 (4), 1958 (33–7). [Siam.e.]

The author describes the species as a thorny, woody, and bushy climber found in the more humid parts of the district, and tabulates its exploitation in 1948–53 by numbers and cu.m. It propagates easily by cuttings, grows ca. 5 cm. in girth annually and becomes exploitable at or above 15 years old, when 35–50 cm. in girth, o.b. It is cut into lengths of 1–2 m., barked, and the sapwood removed, leaving ca. 20 cm. girth of heartwood which is used as a dye and medicine. Recommendations are made for better control of working and hence conservation of supply.

3961. YOUNGKEN, H. W., SR. **A study of the root of *Morinda citrifolia* Linné. I.** *J. Amer. pharm. Ass. (sci. Ed.)* 47 (3), 1958 (162–5). 6 refs. O.R.S.

Describes the tree and discusses its distribution, the physical characteristics and histology of the root, and the appearance and identification of the powdered root.

3962. KINCL, F. A., and GEDEON, J. Über die Inhaltsstoffe von *Moringa pterigosperma.* **[The constituents of *M. pterygosperma.*]** *Archiv der Pharmazie, Weinheim/Bergstr.* 290 (6), 1957 (302–3). 3 refs. [G.g.] O.R.S.

The stem bark contained β-sitosterol and very small quantities of two alkaloids.

3963. LAUMAS, K. R., and SESHADRI, T. R. **Chemical components of the bark of *Phyllanthus emblica* Linn.** *J. sci. industr. Res. India* 17*B* (4), 1958 (167–8). 1 ref. P.O.

The petroleum and ether extracts of the air-dried bark yielded lupeol, and further extraction with acetone yielded leucodelphinidin.

3964. AMMAL, E. K. J., and RAGHAVAN, R. S. **Polyploidy and vitamin C in *Emblica officinalis* Gaertn. [*Phyllanthus emblica*].** *Proc. Indian Acad. Sci.* 47 *B* (5), 1958 (312–4 + 1 plate). 2 refs. O.R.S.

The chromosome number of wild plants collected from various parts of India was $2n = 98$, while that of cultivated plants ranged from $2n = 98$ to $2n = 104$, fruit size increasing with the chromosome number. Analysis of fruit from a wild form with small fruits and 2 cultivated forms with larger fruits showed ascorbic-acid content increasing with fruit size.

3965. STORY, R. **Some plants used by the bushmen [of the Bechuanaland Protectorate and S.W. Africa] in obtaining food and water.** *Mem. bot. Surv. S. Afr.* No. 30, 1958. pp. 115. 30 refs. Price 13*s.*

Species described include a number of trees and shrubs, among them *Acacia* spp., *Burkea africana, Ricinodendron rautanenii, Sclerocarya caffra, Adansonia digitata, Combretum* spp., *Strychnos* spp. and *Terminalia sericea.*

3966. THUDIUM, F., *et al.* Die Glykoside von *Acokanthera schimperi* (A. DC.) Benth. et Hook. 2. Mitteilung. Untersuchung des Wurzel- und Zweig-Holzes der Form, die von den Wa-Giriama zur Pfeilgiftbereitung verwendet wird. **[The glycosides of *A. schimperi.* 2. Investigations on root- and branchwood of the form used by the Wa-Giriama in preparing arrow poisons.]** *Helv. chim. Acta* 41 (3), 1958 (604–14). 18 refs. [G.g.] O.R.S.

892.6. Resin and Turpentine. Essential Oils. Fixed Oils and Fats. Gums. Latex. Dyestuffs. Sap Sugar

See also Nos. 2756, 3203–6, 3928, 3955, 3960.

3967. SIŁA, B., and RADY, M. Sucha żywica świerkowa. **[Dry Spruce resin.]** *Sylwan* 101 (12), 1957 (80–7). 14 refs. [Pol.russ.e.]

Presents results of chemical analysis. [Cf. *F.A.* 18 No. 3526.]

3968. LOMBARD, R., and ROMMERT, L. Sur la présence de β-phellandrène dans l'essence de térébenthine des Landes. **[The presence of β-phellandrene in oil of turpentine from the Landes.]** *Abstr.* in *Bull. Soc. chim. France* 1957 (4), (461). [F.] O.R.S.

3969. SOKOLOV, A. G., and BARDYŠEV, I. I. Sostav kisloj časti kanifoli iz živicy sosny obyknovennoj. **[Composition of the acid fraction of rosin from *Pinus sylvestris* oleoresin.]** *Gidrol. lesohim. Prom.* 11 (2), 1958 (5–7). 10 refs. [Russ.] P.R.

The main components are abietinic resin acids which govern some undesirable properties e.g. ready oxidation by atmospheric O. To improve the rosin's chemical properties better distillation methods, e.g. using a vacuum, should be applied in order to decrease the isomerization of levopimaric acid, and approximate the acid fraction to that of the original resin.

3970. SCHIB, R. Untersuchungen über tageszeitliche Schwankungen des Wirkstoffgehaltes in Arznei-Pflanzen. 4. Mitteilung. Die Tagesperiodizität des Gehaltes an ätherischem Öl im Laubblatt von *Pinus silvestris* L. **[Daily variations in the constituents of medicinal plants. IV. The daily periodicity of the volatile oil content of *P. sylvestris* leaves.]** *Pharmaceutica Acta Helvetiae, Zürich* 33 (4/5), 1958 (180–8). [G.g.f.e.it.] L.S.

In 2 out of 3 series of tests, each covering 24 hours with 4-hour intervals, significant but small variations of volatile-oil content of the needles occurred with respect to crude fibre as well as to dry and fresh weight.

3971. LOMBARD, R., and HŒUSER, J. Étude de la fraction légère de l'essence d'*Eucalyptus dives*. **[The light fraction of oil of *E. dives*.]** *Abstr.* in *Bull. Soc. chim. France* 1957 (8/9), (66). [F.] O.R.S.

The composition of the fraction distilling at > 75° [C.?] at 15 mm. proved to be: α-phellandrene 58%, cymene (para) 20%, α-thuyene 7% and eucalyptol 3%.

3972. NEIRINCKX, G., and STRUELENS, H. Recherches sur une huile essentielle d'*Eucalyptus dives* 'type', originaire du Kivu. **[An essential oil of *E. dives*, [Penfold's physiological] type grown in Kivu (Belgian Congo).]** Direction de l'Agriculture, des Forêts et de l'Élevage, Brussels. 1958. pp. 42. 52 refs. [F.] Price *Fr.*20.

[Cf. *F.A.* 19 No. 3653.] Of the 4 physiological forms distinguished by Penfold (1927), the characteristics of which are tabulated here, the two samples of oil studied correspond closely with Penfold's 'type' which contains 45–53, 0, and ca. 40% of piperitone, cineol and phellandrene respectively, as against 48 and 49, 0, and 28 and 30% in these samples. The physical characters and composition of piperitone, phellandrene and limonene-dipentene are examined in detail; those of other substances contained in the oil will be published in the near future.

3973. UGARTE LAISECA, J., *et al.* Laboratorio general de química forestal. Aceites esenciales. **[General laboratory of forest chemistry. Essential oils.]** *An. Inst. for. Invest. Exp., Madrid* No. 2, 1957 (87–9). [Span.]

Presents the results of analyses of the oil of *Eucalyptus globulus*.

3974. DUPONT, G., DULOU, R., and POULIQUEN, F. Étude sur l'huile d'Ongokéa (ou Isano). **[Oil of Ongokea (or Isano).]** *Bull. Soc. chim. France* 1957 (11/12), (1495–8). 13 refs. [F.f.] O.R.S.

From the kernel of the fruit.

3975. BÉZANGER-BEAUQUESNE, L., CHOSSON, J., and VERHILLE, F. Sur la gomme du *Cedrela odorata*. **[The gum of *C. odorata*.]** *C.R. Acad. Sci., Paris* 247 (15), 1958 (1132–4). 1 ref. [F.f.] O.R.S.

Glucuronic acid, galactose, arabinose and rhamnose were identified in the gum.

3976. KOEV, D. V., and BOŽINOV, B. B. Opiti za polučavane na rastitelna gutaperča ot mestna surovina. **[Gutta percha from native plants.]** *Izv. Inst. Gorata bălg. Akad. Nauk., Sofia* No. 2, 1957 (309–44). 13 refs. [Bulg.bulg.russ.g.]

Describes methods of processing gutta from *Euonymus*, based on methods used in the U.S.S.R. [Cf. *F.A.* 20 Nos. 3211–2.] The species that occur in Bulgaria are *E. verrucosus*, *E. europaeus* and *E. latifolius*.

892.7. Fruits. Seeds. Fibres, Yarns and Flosses

See also No. 3955.

3977. BECKMANN, S., and MANZ, A. Über einige Inhaltsstoffe der Bucheckern. **[Some constituents of Beech nuts.]** *Chem. Ber.* 92 (1), 1959 (161–3). 7 refs. [G.g.] O.R.S.

Fumaric acid, *p*-hydroxybenzoic acid, vanillic acid, *p*-hydroxycinnamic acid and ferulic acid were identified by paper chromatography and spectral analysis.

3978. SANNIÉ, C., LAPIN, H., and VARSHNEY, I. P. Sur les sapogénines d'*Albizzia lebbek* Benth. **[The sapogenins of [the seeds and fruit of] *A. lebbek*.]** *Bull. Soc. chim. France* 1957 (11/12), (1440–4). 18 refs. [F.f.] O.R.S.

3979. KARIYONE, T., and TOBINAGA, S.; TOBINAGA, S. **[Studies on triterpenoids. XII, XIII. Studies on japoaescin, a saponin from [the fruit of] *Aesculus turbinata* Blume. I. Constitution of japoaescin. II. The constitution of japoaescigenol. (1).]** *J. pharm. Soc. Japan* 78 (5), 1958 (531–7). 9 refs. [Jap.e.e.] O.R.S.

892.8. Heather. Broom, etc. Osiers, Canes and Bamboos. Reeds and Rushes. Thatching Materials

See Nos. 3906–7.

9. FORESTS AND FORESTRY FROM THE NATIONAL POINT OF VIEW. SOCIAL ECONOMICS OF FORESTRY

90. General.

See also Nos. 2684, 4010–1.

3980. GOOR, A. Y. **Ten years after.** *Emp. For. Rev.* 37 (4), 1958 (418–20).

A summary [by the Conservator of Forests] of the development and work of the Palestine Forest Department since the termination of the British Mandate in 1948.

3981. HUGUET, L. Informe al gobierno de Cuba sobre política forestal y su ejecución. **[Report to the government of Cuba on forest policy and its implementation.]** Expanded Technical Assistance Program, FAO, Rome. *FAO Report* No. 876, 1958. pp. 76 + 4 sets of gphs., 1 dgm., 5 maps, 12 photos. 33 refs. [Span.] Limited distribution.

3982. Rapports nationaux de politique forestière. France, Départements de la Guadeloupe et de la Martinique et Département de la Guyane, année 1957. **[National progress reports on forest policy. France—Guadeloupe, Martinique and French Guiana.]** [*Docum.*] *6th Sess. FAO Latin Amer. For. Comm., Guatemala, 1958* No. *FAO/LAFC*-58/22 Suppl. 1, 1958. pp. 5. [F.] Limited distribution.

3983. Informes nacionales sobre progreso en política forestal. Brasil. **[National progress reports on forest policy. Brazil.]** [*Docum.*] *6th Sess. FAO Latin Amer. For. Comm., Guatemala 1958* No. *FAO/LAFC*-58/7 Suppl. 1, 1958. pp. 6. [Span.] Limited distribution.

3984. AZAMBUJA, D. DE. Defesa florestal e reflorestamento. **[Forest protection and afforestation.]** *Brasil madeireiro* No. 125, 1958 (22–3). [Port.]

Reviews briefly the work of the Brazil Forest Service during 1957 in encouraging afforestation, creating forest reserves, planning research, organizing forest protection, furthering knowledge of wood technology, and in forest education.

3985. PERFUMO, L. Informe al gobierno del Paraguay sobre tratamientos silvícolas y reforestación a ejecutarse con el fondo forestal. **[Report to the government of Paraguay on silvicultural measures and afforestation work to be undertaken with the aid of a forestry fund.]** Expanded Technical Assistance Program, FAO, Rome. *FAO Report* No. 779, 1958. pp. 23 + ii + 81 + iii + 101 + 3 maps + 14 tbls. + 26 photos. 8 refs. [Span.] Limited distribution.

902. History of Forests and Forestry

See also No. 4004.

3986. WHITE, H. M. **Thoughts on oral history.** *Repr.* from *American Archivist* 20 (1), 1957 (19–30).

An account by an experienced member of the staff of the Forest History Foundation, Inc., St. Paul, Minn., of the Foundation's oral history programme and of the techniques called for, as exemplified in the St. Croix Valley survey, 1955.

3987. EDLIN, H. L. **Place names as a guide to the ancient woodlands of Wales.** *Quart. J. For.* 53 (1), 1959 (22–7). [Cf. *F.A.* 15 No. 3117.]

3988. CHABROL, P. Histoire de la Maîtrise de Quillan (du XVI[e] au XVIII[e] siècle). **[History of the Maitrise de Quillan (16th–18th century).]** *Rev. for. franç.* 11 (1), 1959 (1–18). [F.]

The history of the management of a royal forest in the Pyrenees.

3989. JANČÍK, A. Odlesňování Těšínska v minulosti. **[Deforestation of the Těšín region in the past.]** *Sborn. čsl. Akad. zeměd.* (*Lesn.*) 4 (10), 1958 (915–32). 22 refs. [Cz.cz.russ.e.]

Traces the history of settlements in the region, involving deforestation for agricultural needs, chiefly pasture, and also a change in the composition of the forests (Spruce replacing Silver Fir and Beech).

3990. BUCHHOLZ, E. Aus der Geschichte der russischen Wald- und Holzwirtschaft vom Beginn des 19. Jahrhunderts bis zum Ersten Weltkrieg. **[The history of Russian forestry and timber industry from the beginning of the 19th century to World War I.]** *Repr.* from *Jahrbücher für Geschichte Osteuropas* 6 (3), 1958 (305–33) 46 refs. [G.]

Covers the development of plantations; German influence; the development of Russian national forestry; outstanding Russian forest workers and scientists of the 19th century; administration, organization and laws; the development of the Russian timber industry; and timber trade policy. [Cf. *F.A.* 20 No. 3996.]

903. Forest Policy, General

3991. BRÜNIG, E. F. Betrachtungen zur Entwicklung des britischen Forstwesens in Geschichte und Gegenwart. **[Comments on the development of British forestry, past and present.]** *Allg. Forst- u. Jagdztg.* 129 (11/12), 1958 (252–60). 18 refs. [G.g.e.]

Briefly traces the history and present position of forest policy and its implementation, stressing the differences between 'going-concern' forestry in Germany and conditions in Britain, where the main stress is on afforestation and the most profitable use of the capital invested. In the author's view, tending of older stages is often neglected or mechanical, road-building and objects of management insufficiently planned, and co-operative forestry not adequately supported.

3992. **[Forestry Commissions in Canada.]** *Pulp Paper Mag. Can.* 59 (11), 1958 (160, 166, 168 . . . 176, 182–4).

Summarizes 14 papers read at the jubilee convention of the Canadian Institute of Forestry. One paper deals with the recommendation of the [1957] Gordon Commission on Canadian economic prospects (forestry section) [see *F.A.* 19 No. 3352], 5 with those of the royal commissions of British Columbia (1957) [see *F.A.* 19 No. 2549], Saskatchewan (1947)

[see *F.A.* 9 No. 1970], Ontario (1947) [see *F.A.* 9 No. 665], Newfoundland (1955) [see *F.A.* 17 No. 2312], and New Brunswick (1957) [see *F.A.* 19 No. 2557] and one reviews the whole corpus. Six other papers discuss all aspects of their actual implementations, with a view to a forest policy for Canada as a whole.

904. General Regional Accounts of Forests and Forestry

3993. BÉRARD, M. La forêt vosgienne. [**The forests of the Departement des Vosges.**] *Bull. Soc. for. Franche-Comté* 29 (4), 1958 (197–217 + map). [F.]

Outlines the extent, type, history, management and yield of these forests.

3994. LEFEBVRE, R. Notes forestières et botaniques sur l'Île Sainte-Marguerite. [**Forestry and botanical notes on the Île Ste.-Marguerite.**] *Ann. Éc. Eaux For. Nancy* 15 (2), 1957 [1958], (415–54 + map). [F.]

Notes on the forest types, plantations, maquis, and littoral flora of the largest of the Lérins group near Cannes.

3995. ANDERSON, M. L. **Norway revisited.** *Scot. For.* 13 (1), 1959 (17–28).

An account covering forest composition and structure; silvicultural notes; management and organization; felling, extraction and utilization; education; and research and experiment.

3996. BUCHHOLZ, E. Wald- und Holzwirtschaft der Sowjetunion. [**Forestry and wood industry in the U.S.S.R.**] *Repr.* from *Holz-Zbl.* 84 (73/74), 1958 (410–5). [G.]

Chiefly based on statistics and plans published in connexion with the 40th anniversary of the October Revolution, on total forest area, species, age and geographical distribution, exploitation, regeneration and afforestation, administration, etc. [Cf. *F.A.* 20 No. 3990.]

3997. BUTOVIČ, M. [Editor]. Ukrajins'kyj lisnyc'kyj al'manah. [**Ukrainian Forestry Almanac.**] Union of Ukrainian Foresters and Woodmen in U.S.A, New York. 1958. pp. 164 + 8 plates. 106 refs. [Ukr.]

A book dedicated to the forests and foresters of the Ukraine, and containing 24 articles on various aspects, past and present, of Ukrainian forests, forest literature, foresters etc. [some of which are noticed separately].

3998. NYKYTYN, P. Gospodars'kyj ogljad lisiv Ukrajiny. [**An economic review of Ukrainian forests.**] In *Ukrajins'kyj lisnyc'kyj al'manah*, New York, 1958. pp. 36–52. 8 refs. [Ukr.]

Covers the forest area, scientific institutions dealing with forestry, the geographical and botanical regions, relative importance of the various tree species, increment, management, fellings etc.

3999. BALTAXE, R. **Forestry in Iraq.** *Sylva, Edinb.* No. 39, 1958/1959 (5–9, 24 + 3 photos).

Includes a brief description of the forest types and of the gradual development of the activities of the forest department in protection (chiefly against charcoal burning), afforestation (erosion control and amenity plantings round the new mountain resorts), economic plantations of fast growing trees (species, mechanization etc.), and research (irrigation techniques, establishment of conifers without irrigation, etc.).

4000. BÉGUÉ, L. Les forêts de la République du Soudan. [**The forests of the Republic of the Sudan.**] *Bois For. Trop.* No. 62, 1958 (3–19). 9 refs. [F.e. span.]

Gives some account of the principal vegetation types, forest products, forest administration etc.

4001. MÉTRO, A. Atlas du Maroc: Notices explicatives, Section VI—biogéographie. Forêts et ressources végétales: Planche no. 19 a. Forêts. [**Atlas of Morocco. Explanatory notes. Section VI—Biogeography. Forests and plant resources. Sheet 19 a. Forests.**] Comité de Géographie du Maroc, Rabat. 1958. pp. 157 + 10 photos. [F.]

Includes a general description of the forests and their distribution, distribution and silvicultural characters of the principal species, and notes on afforestation, use of exotic species etc.

4002. LHOAS, J. A. Monographie forestière de la Province du Katanga. [**Forest monograph on the Katanga Province [S.E. Belgian Congo].**] Direction de l'Agriculture, des Forêts et de l'Élevage, Brussels. 1957. pp. 103 + 1 map. 13 refs. [F.f.]

Covers legislation, reservation, climate, vegetation (with map), forest economy, silviculture, management, protection, production and staff. Of the two administrations, the Katanga Special Commission control $\frac{6}{7}$ of the 497,000 sq. km., the Colony, the remainder. Girth/height tables for *Chlorophora excelsa* and *Ricinodendron africanum* are included.

4003. Forêts et production forestière du Brésil. [**Forests and forest products of Brazil.**] *Bull. Soc. for. Belg.* 65 (12), 1958 (713–6). [F.]

905. Forest Statistics and Resources

See Nos. 2690, 2997, 3214, 3609, 3626, 3633.

4004. HAIR, D. **Historical forestry statistics of the United States.** *Statistical Bulletin, U.S. Department of Agriculture, Washington* No. 228, 1958. pp. 36.

A compilation from 169 statistical series, including: (1) forestry statistics covering national forests and Forest Service cooperative programmes; (2) forest products statistics; and (3) price statistics; all from at latest 1910 and some for as far back as 1799.

4005. CUNNINGHAM, R. N., HORN, A. G., and QUINNEY, D. N. **Minnesota's forest resources.** *For. Resour. Rep. U.S. For. Serv.* No. 13, 1958. pp. 52 + 1 map.

907. Indirect Significance of Forests (Rural Amenity, National Parks, Forest Influences etc.)

See also section 116 and No. 2965.

4006. SASPHASRI, B. [**Recreational grounds.**] *Vanasarn* 16 (3), 1958 (54–68). [Siam.e.]

Suggests areas suitable for National Parks (two already established) and lists the Parks and Arboreta actually proposed.

91. Land Use, Land-Use Policy (including Afforestation Policy)

See also No. 2723.

4007. DENMAN, D. R., SWITZER, J. F. Q., and SAWYER, O. H. M. **Bibliography of rural land economy and land-ownership 1900–1957. A full list of works relating to the British Isles and selected works from the United States and Western Europe.** Department of Estate Management, Cambridge University. 1958. pp. xii + 412. Price £1. 15*s*. 0*d*.

A classified bibliography with author and subject indexes.

4008. YAPP, W. B., and WATSON, D. J. [Editors]. **The biological productivity of Britain.** *Symposia of the Institute of Biology, London* No. 7, 1958. pp. 128. Price 25*s*.

Contains 13 papers read at the 1957 symposium, with the discussions that followed, including: The land-use pattern of Britain (*L. Dudley Stamp*); The recent history of land-use (*G. P. Wibberley*); The present productivity of forests (*M. V. Laurie*) [refereenced separately]; Some biological considerations of forest production (*J. D. Ovington*); Water control for increased crop production (*H. L. Penman*); and The future of British uplands (*J. B. Cragg*).

4009. LAURIE, M. V. **The present productivity of forests. With discussion.** *Symposia of the Institute of Biology, London* No. 7, 1958 (73–82). 5 refs.

Discusses, *inter alia*, the land available for forestry, i.e. land unsuitable for agriculture but not for forestry; the chief limiting factors (exposure and poor depth of soil); the relative productivity (on quality II sites at 50 years) of 11 species including exotic conifers; rotations, future development of yields etc.

4010. PEKER, H. Seyhan ve Ceyhan havzalarında orman tahripleri, sebepleri, neticeleri ve bunlara karşı alınacak tedbirler hakkında arastırmalar. **[Causes and effects of forest destruction in the Seyhan and Ceyhan areas [of Anatolia] and necessary remedial measures.]** *Istanbul Üniv. Orm. Fak. Derg.* 7 *A* (2), 1957 (41–96). [Turk.g.]

Describes in detail, against the general background of Mediterranean and Turkish forest economies, the malpractices ruining an area of > 4400 sq. km., 31% of which is forested, viz. nomadic grazing, lopping for fodder, shifting cultivation, and timber and fuel exploitation ca. 3 times the increment. Among remedies recommended are: (*a*) soil classification, land-use planning and the exact delimitation of forest, agricultural and pasture land; (*b*) resettlement of forest dwellers under a special organization; (*c*) creation of regional forest and central soil conservation services with an afforestation and conservation policy; (*d*) heavier penalties for breaches of forest laws; (*e*) education and propaganda for forestry.

4011. **Land.** *Yearb. Agric. U.S. Dep. Agric.* 1958. pp. 605.

The volume covers many aspects of land use, including management, land-use planning, financial aspects (land values, taxation, credits etc.), production problems, conservation etc. The section 'Our woods and tempted hills' contains the following articles: Our vital private forest lands (*J. R. McGuire*); The care and use of national forests (*E. P. Cliff*); Programmes for forest management (*W. S. Swingler* and *F. A. Conolly*) [describing schemes of assistance and guidance to private owners by federal or state agencies]; Clearing land for different uses (*S. R. Anderson, A. Poli*, and *L. A. Reuss*); and The potential demand for timber (*D. B. King* and *I. I. Holland*).

4012. CLAWSON, M., and HELD, B. **The federal lands; their use and management.** John Hopkins Press, Baltimore. 1957. pp. xxi + 501 + 13 photos. Many refs. Price £3. 8. 0.

A study, chiefly from an economic point of view, covering *inter alia* the land-use patterns of national forests, national parks, grazing lands etc. (e.g. harvesting timber, grazing, watershed utilization, wildlife and recreation), revenue and expenditure relating to these activities, including pricing systems for timber (competitive bids, contracts etc.), investment in forests, and future policies.

92. Forest Ownership and Ownership Policy

See also Nos. 2690, 3614, 3616, 3634, 4007, 4012, 4025.

4013. THATIEMROMYA, P. **[Permits and concessions for working the forests.]** *Vanasarn* 16 (3), 1958 (27–36). [Siam.e.]

Describes the procedure laid down since 1953 and the principles followed for commercial, departmental and private use, and for free grants.

93. Public Supervision and Regulation of Forestry, including Legislation for these Purposes

4014. Boswetnummer. **[Forest law issue.]** *Ned. Bosb. Tijdschr.* 30 (12), 1958 (329–59). [Du.]

The greater part of the issue is devoted to the draft forest law before the Lower Chamber of the States General, which provides for notification by the owner or tenant of his intention to fell (licences are no longer necessary), replanting within 3 years, prohibition of felling by the minister concerned on grounds of erosion danger or amenity, and compensation, credits and subsidies, and lays down penalties for infringements of the terms of the law. The number includes the terms of a report by *C. H. F. Polak* to the Forestry Board, and of a memorandum by the Board to the Lower Chamber, and papers by *J. W. Bax* and *J. van Soest* commenting on the draft law.

4015. Ley de montes. Discurso pronunciado en la sesión plenaria de las Cortes Españolas el día 28 de mayo de 1957 y texto de la ley aprobada. **[Forest law. Speech delivered at the plenary session of the Spanish Parliament on 28th May, 1957, and the text of the law passed.]** Dirección General de Coordinación, Crédito y Capacitación Agraria, Ministerio de Agricultura, Madrid. 1957. pp. 90. [Span.] [Cf. *F.A.* 20 No. 1320.]

4016. GARCIA-ESCUDERO, P., and URRUTIA, F. DE. La nueva ley de montes. **[The new forest**

law.] *Montes, Madrid* 14 (83–84), 1958 (361–7; 453–61). [Span.]

On 8 June 1957 a new forest law was enacted in Spain, replacing one existing since 1863. The processes by which the new law was formulated are described, the original projected law is summarized, and modifications approved for the final version are presented.

4017. Ley forestal. **[Forest law.]** Dirección Forestal, Ministerio de Fomento, Quito. 1958. pp. 8. [Span.]

The text of the new forest law of Ecuador, which came into force on 24th January, 1955.

4018. SCHWARZ, H. Vorkehrungen gegen Hochwässer in Wildbachgebieten. **[Flood control measures in torrent areas.]** *Öst. Vjschr. Forstw.* 99 (3/4), 1958 (153–82). [G.]

Discusses the recommendations made by Austrian forestry associations after the flood disasters of 1882, and reproduces the text of the law on torrent training (originally 1884), of Carinthian water and forest police regulations of 1911 (clear-felling and driving restrictions, rules for skidding etc.), and sections of the draft forest law of 1956.

94. Other Methods to Implement Forest Policy

945.1. Advisory and Information Services, Documentation Centres

See also No. 3217.

4019. FRIEDRICH, A. G. Internationale Dokumentation für die Forst- und Holzwirtschaft. **[International documentation for forestry and forest products.]** *Holz-Zbl.* 84 (149), 1958 (1895–6). [G.]

Discusses international collaboration in documentation, classification, and terminology, and the German contribution, present and envisaged, including the *Bibliographie des forst- und holzwirtschaftlichen Schrifttums* with its ancillary title and translation services etc., the *Forstliche Umschau*, and the set-up for terminology, including the role of the German Standards organization (Fachnormenausschuss Holz) in terminology, and classification etc.

945.3. Education. Training. (Including Educational Tours and Information on Careers.)

4020. YODER, R. A. **Forestry education in Thailand, the modern Siam.** *J. For.* 57 (1), 1959 (29–32).

Discusses the importance of forestry in Siam, and the College of Forestry at Kasetsart University, Bangkok, mentioning also American aid for forestry education in Siam.

4021. KIVINEN, E., and LAITAKARI, E. Helsingin yliopiston maatalous-metsätieteellisen tiedekunnan vaiheita. **[Education in agriculture, forestry and home economics at the University of Helsinki.]** *Silva fenn.* No. 95, 1958. pp. 284. [Fi.e.]

4022. SHIRLEY, H. L. **Forestry education and research in Russia.** *J. For.* 56 (12), 1958 (892–9). 2 refs.

Records the impressions and facts received on a tour in the U.S.S.R. to study forest education and research. Covers organization, curricula, post-graduate study, equipment, research projects etc., and compares the scope and quality of Russian forestry education and research with the American.

4023. MACMILLAN, H. R. **The profession and practice of forestry in Canada 1907–1957.** Faculty of Forestry, University of Toronto. [1958?] pp. 15.

945.4. Research

See also No. 4022.

4024. MCKELVEY, P. J., and CAMERON, R. J. **Design for a forest study.** *N.Z. J. For.* 7 (5), 1958 (116–22). 6 refs.

Describes a programme of ecological studies to be carried out in the forests of North Island in supplementation of the New Zealand National Forest Survey.

946.1. Associations. Societies

4025. HOLOPAINEN, V. Metsätalouden edistämistoiminta Suomessa: Tapio 1907–1957. **[Promotion of private forestry in Finland: Tapio 1907–57.]** *Silva fenn.* No. 94, 1957. pp. 322. 63 refs. [Fi.e.*e.*]

Reviews progress in private forestry, with particular emphasis on the activities of the Finnish Forestry Association Tapio, founded in 1907 for the purpose of promoting private forestry.

95. Forest Taxation

4026. HALL, R. C., NELSON, A. Z., and WILLIAMS, E. T. **The difference between a forest yield tax and a forest severance tax.** *J. For.* 57 (1), 1959 (38–9). 1 ref.

The following definition has been recommended by the Division of Economics and Policy, Society of American Foresters: "A tax upon the cutting of timber should be termed a yield tax if it is imposed in place of the property tax and as a severance tax if it is imposed in addition to the property tax".

96. Forest Labour Questions. Labour Questions in Wood Transport and the Wood Industries

4027. MALONE, P. D. **Stirrings in the forests.** *Irish Management, Dublin* 5 (3), 1958 (31–7).

A description of a group incentive scheme introduced by the Irish Forestry Division, based on standard times required for the most important jobs under a variety of conditions, as evaluated by a team of work-study men and foresters (i.e. not piece rates). The new scheme, which accompanies the introduction of a national wage basis for forest workers, has the cooperation of the men and the union. Savings of ca. 20% are expected. A right to withhold part of the bonus for poor workmanship ensures reasonable standards.

97. International Forest Policy and Other International Collaboration

971. Congresses, Conferences

See Nos. 2694, 2739, 2756, 2874, 3072, 3637.

972. Organizations

See also No. 3631.

4028. **Near East Forestry Commission 2nd Session Final Report, Cairo 27 October–1 November 1958.** FAO, Rome. No. *FAO/NEFC*–58/32, 1958. pp. 54. Limited distribution.

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References: 1. *Allgemeine Forstzeitschrift*, Munich; 2. *Botaničeskij Žurnal*, Moscow; 3. *Chêne-Liège*, Constantine; 4. *FAO Plant Protection Bulletin*, Rome; 5. *Forestry Chronicle*, Toronto; 6. *Holz-Kurier*, Vienna; 7. *Journal of Forestry*, Washington; 8. *Journal of the Land Agents' Society*, London; 9. *Lesnaja Promyšlennost'*, Moscow; 10. *Lesnoe Hozjajstvo*, Moscow; 11. *Lumberman*, San Francisco; 12. *Nature*, London; 13. *Revista Forestal Argentina*, Buenos Aires; 14. *Southern Lumberman*, Nashville, Tenn.; 15. *Timber Trades Journal*, London; 16. *Unesco Bulletin*, Paris; 17. *Veneers and Plywood*, Indianapolis; 18. *Wood Preserving News*, Chicago; 19. *Wood Worker*, Indianapolis.

International Conferences

1960	**F.A.O.**	
Oct.–Nov.	Latin-American Conifer Study Tour and Seminar.	Mexico
Date and place undetermined	Far East Consultation on Wood Preservation and Seasoning.	
,,	Symposium on Technical Aspects of Shifting Cultivation.	
1959	**Other**	
9–11 June	Forestry Conference arranged by the Joint Commission of the Common Market, for consideration of timber trade policy.	Brussels
14–19 Sept.	International Conference on the use of Aircraft in Agriculture.	Cranfield, Beds,
1961		
June	13th IUFRO Congress.	Vienna

Symposia

Plant Resources of the Middle East for the Pharmaceutical Industry. A symposium on this subject. organised jointly by UNESCO and the Pakistan Association for the Advancement of Science, will be held, probably in Peshawar, in Oct. 1959 (**16**; April 1959).

International Symposium on the Chemistry of Natural Products. This important symposium is being organized by the Australian Academy of Sciences under the auspices of the International Union of Pure and Applied Chemistry, and will be held from Aug. 15th to 20th, 1960, in Melbourne, Canberra, and Sydney. It will be devoted to the organic chemistry of natural products; the term 'natural product' being used broadly to describe any substance produced by the metabolism of micro-organisms, plants, and animals (**16**; April 1959).

Argentina. The first forestry association to be formed in Argentina was created on 27 July 1958. This is the Camara de Forestadores de la Provincia de Córdoba. The object of the association is to encourage afforestation, exchange information, and look after the interests of forestry undertakings (**13**; Jan./March 1959).

Austria. Two new processes for using wood waste have been patented by Austrian firms. One is for making high quality boards for building and furniture manufacture from green sawdust without the addition of chemicals, and the other for making high-grade insulation board from all kinds of wood waste (including bark and phloem waste from pulp mills) combined with oil-refinery wastes (**6**; 2.7.1959).

Canada. A rubber-tyred skidding tractor has been designed by Timberland Machines Ltd. of Woodstock, Ont., to go to the stump to gather and skid its load of tree lengths or short wood for delivery to the intermediate or final landing. In pulpwood stands it will handle 2 cords of tree lengths or 1 cord of 4-ft. or 8-ft. bundled wood. On saw-log operations it will handle up to 1500 ft. in tree lengths or 16-ft. logs. It is designed with low pressure (25 lb.), large (15.00 × 34 tyres), providing a stump clearance of 22 in., excellent traction, flotation and rolling radius; tyre chains are not necessary (**5**; Dec. 1958).

Chile. A school was set up in Concepción in Oct. 1958 for training forest guards in the protection of the forests, particularly against fire. The school and its training are modelled on those of Germany, which have been in existence for 180 years, and are the result of a West German mission to Chile in 1956 for the study of the forest situation there. It is also proposed to erect 25 fire look-out towers in communication with Concepción. The West German government has presented materials, vehicles &c. worth 25 million Chilean pesos (**13**; April/June 1959).

Finland. A new type of particle board, marketed as LYNX-NG, which has been developed in Finland, is claimed to be fire-resistant and non-smouldering. Under the influence of heat certain chemicals incorporated in the board form gases that prevent contact between the basic materials and the oxygen in the air (**6**; 2.7.1959).

Germany. A trial plantation of 100 *Metasequoia glyptostroboides* at Weinheim, Baden, has been so successful that large-scale trial plantations are being planned (**6**; 12.3.1959).

The Federal Republic has prohibited the importation of living specimens of all species of Oak and Poplar (excluding fruit and seed) from Canada and the U.S.A. Oak timber and sawn wood can be imported only from areas free from Oak wilt (**4**; Feb. 1959).

A German manufacturer has produced a starting mat for vehicles stuck in mud, snow, ice, etc. It consists of a number of steel plates 17 cm. wide, fitted with studs, loosely joined by ropes. Vertical serrated edges prevent the mats from slipping on iced surfaces, and the studs provide grip for the tyres. The mats are said to have been tried satisfactorily under various conditions and under considerable loads (**1**; 28.2.1959).

Great Britain. The Forest Tree Seed Association for England and Wales, which was recently set up on similar lines to that already functioning in Scotland, is preparing a preliminary list of approved seed sources to be issued to members. The Association, which is voluntary and non-profit-making, will operate a certification scheme through which members will collaborate in collecting and processing seed from selected parent trees (known as approved seed sources), in rearing plants from the seed, and in marketing seeds or plants under the scheme. Further information and forms of application for membership can be obtained from the secretary of the Association, 25 Savile Row, London, W.1 (**8**; June 1959).

The Nature Conservancy has recently announced the establishment of 4 new nature reserves and one forest nature reserve: The Rhinogs nature reserve, ca. 5 miles E. of Harlech; Coed Dolgarrog nature reserve, 7 miles S. of Conway (untouched Oakwood, many of the trees being intermediate between Sessile and Pedunculate Oak; also the Ardda Alder woodlands at 750–850 ft. alt.); Coed Gorswen nature reserve at the N. end of the Conway valley (intermediate Oak with some Elm, Ash, and Alder); Allt Rhyd-y-groes nature reserve, 9 miles N. of Llandovery (mainly Sessile Oak); Blackcliff and Wyndcliff forest nature reserve, forming part of Tintern Forest (steep slopes, finely wooded with Ash, Wych Elm, Beech, Small-leaved Lime, Yew, Oak, Cherry, Whitebeam and Service tree) (**12**; 13.6.1959).

Control of 'forest hogs'. As a shock treatment for litter fiends, people who had been picknicking in Hampshire woods received through the post, in neat, though unstamped parcels, the 'property' they had left behind—tins, bottles, orange peel and all. Boy scouts had acted as spotters, and offenders were traced by their car registration numbers (**1**; 4.4.1959).

What is believed to be the first pre-fabricated church spire constructed in this country has been made for the Church of Our Lady of Fatima, Harlow New Town. It is nearly 80 ft. high, of stressed plywood construction, with diaphragms every 5 ft., and covered by copper. It was transported by lorry from Rainham to Harlow (**15**; 14.3.1959).

Thin films of polytetrafluoroethylene on metal and other surfaces are in use because of their properties of low friction, stability at high temperatures, resistance to chemical attack, and weak adhesion. Methods of fixing the film on the base material involve sintering at 400° C, and for this reason films on rubber, plastics, wood and certain metals have not easily been obtained. A dispersion of polytetrafluoroethylene, under the trade name 'Emralon' (Acheson Colloid, Ltd.) has now become available that enables a coating of the polymer to be resin-bonded at low temperatures to a variety of surfaces. In addition to its applicability to heat-sensitive substances, stronger adhesion and greater resistance to wear and corrosion are claimed (**12**; 30.5.1959).

India. Studies are being made at Dehra Dun on the possibility of using native woods for shuttles and picking sticks for the textile industry. Preliminary experiments indicate that compression, lamination and compregnation can improve the surface, strength and wearing characteristics of

Moringa pterygosperma, *Acacia arabica*, *Dalbergia sisoo*, *Zanthoxylum rhetsa* and *Cedrela toona* to the level of imported Cornel, Persimmon and Hickory (**17**; May 1959).

Morocco. Since last October, enormous swarms of locusts, extending over hundreds of kilometers, have fallen upon the forest areas of the Atlas and Anti-Atlas and the *Argania* forests in the plains. Large numbers of power and hand sprayers, mounted on animals, fast motor vehicles, aeroplanes, and helicopters, have been used in the fight against these swarms (**3**; 15.3.1959).

Sweden. A Swedish firm has developed a method of producing bleached sulphite pulp from Pine, which can be used for many types of paper not previously produced from sulphite pulps (**6**; 12.3.1959).

Uganda. Production has started at a plywood mill at Jinja, which has a capacity of 10 million sq. ft. per annum. Water-proofed plywood and veneer-faced particle board are to be produced, and it is hoped that plywood will cost 15% less than is paid for imported panels (**11**; April 1959).

U.S.A. A chapter of 'The Living Forest' by J. McCormick, published by Harper & Bros., New York in 1958, is entitled 'Stories a stump can tell'. It contains a description of the Discovery Tree, a specimen of Limber Pine [*Pinus flexilis* var. *flexilis*] from Idaho showing a branch section of maximum radius 9·5 in., and 1550 years old. It is less than $\frac{1}{10}$ the size of the Mark Twain Sequoia and 219 years older. Its growth rate, is the slowest ever observed in a North American tree—3 mm. per century (**7**; Feb. 1959).

An ex-Navy diver has built up a prosperous business diving for submerged logs in lakes, and has already raised and sold over a million board feet. He uses canvas bag buoys, inflated with air, to bring the logs to the surface (**14**; 1.4.1959).

The Nichols Boat Works Co., Hood River, Ore., has recently introduced a jet-propelled boom boat, the propulsion unit of which consists of a special centrifugal pump exhausting water through a movable jet nozzle extending $\geq$ 5 in. below the hull to provide a very shallow draft. Powered by an 85-h.p. marine engine giving 500–1000 lb. thrust, the boat is noteworthy for its manoeuvrability in deep, shallow, or congested water, the adjustability of the propulsion jet also enabling a strong lateral thrust to be exerted, thus avoiding the steering difficulties of conventional, purely stern-thrust boats (**19**; May 1959).

The Wells-Griffin Lumber Co. Inc. of Willacoochee, Georgia, has developed a circular saw having only one-fifth the number of teeth found in conventional saws, and therefore producing chips instead of normal sawdust. The fibre length of these chips has been found to be long enough to be used in the manufacture of pulp. The new saw has been found to require less power for operation and to be more durable than conventional saws, and to cut no wider a kerf. Pulping tests are to be made on 20 tons of chips thus produced, and the Forest Products Laboratory, Madison, is testing the saw to determine its mechanical limitations (if any), the optimum rotation rate and rate of feed, the physical character of the sawdust-chips relative to their use as pulp chips, and the net value of the product (**14**; 1.3.1959).

The Hugh P. Baker Wood Products Laboratory, recently built at a cost of $3.75 million at the New York State University, Syracuse, is designed for research and instruction in the properties of wood and in industrial manufacturing methods (e.g. wood preservative treatments, studies of the effect of temperature and m.c. on the moisture diffusion coefficient for wood). Its up-to-date equipment includes 5 pilot preservative treatment plants, 5 experimental dry-kilns, a sawmill, laboratories for studying veneer, plywood, electronics and wood finishing, and conditioning rooms. Curricula provide for a range of undergraduate and graduate courses (**18**; March 1959).

U.S.S.R. A new editorial board of 13 members has been formed to run the *Botaničeskij Žurnal*, following the recent attacks on editorial policy [see *F.A.* 20 p. 163]. Of the 21 members of the old editorial board, only two remain, one of whom, V. F. Kuprevič, has now been appointed editor-in-chief. Among those dismissed are V. N. Sukačev (the previous editor-in-chief), B. A. Tihomirov, and V. B. Sočava, all botanists with international reputations (**2**; Feb. 1959).

Dunaev's 'Kubometer' [cf. *F.A.* 19 No. 4871] has been awarded 2nd prize in a competition organized by the Leningrad Oblast Board of the NTO of Forest Industry for the best automatic log volume indicator. There were nine entries in all, and no 1st prize was awarded. The Kubometer is to be mass-produced when the necessary improvements and refinements have been made (**9**; No. 12, 1958).

The current Seven-Year Plan in the U.S.S.R. envisages the following targets in forestry for 1965 (figures for 1957 in parenthesis): total area of managed forest, 467·4 million ha. (295·3 million); forest areas drained, 175,000 ha./year (48,700); areas tended, 1,346,000 ha./year (779,800); areas sown and planted, 744,000 ha./year (609,600); areas of assisted natural regeneration, 724,000 ha./year (681,400); areas of protective afforestation (sand, etc.), 1,116,000 ha./year (531,700 ha. in 1958) (**10**; Feb. 1959).

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At/THE ROYAL COMMONWEALTH SOCIETY, NORTHUMBERLAND AVENUE, LONDON, W.C.2

OBJECTS OF THE ASSOCIATION

1. To foster public interest in forestry.
2. To secure general recognition of the dependence of timber supply upon forest management.
3. To collect and circulate information relating to forestry and the commercial utilization of forest products.
4. To form a centre for all engaged in forestry.
5. To provide a means of communication between all concerned.

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8*th May*, 1958.